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Electrically-Driven Cargo Vessel

The Tynemount, the First Merchant Vessel to Have Electric Drive Will Come to the Lakes

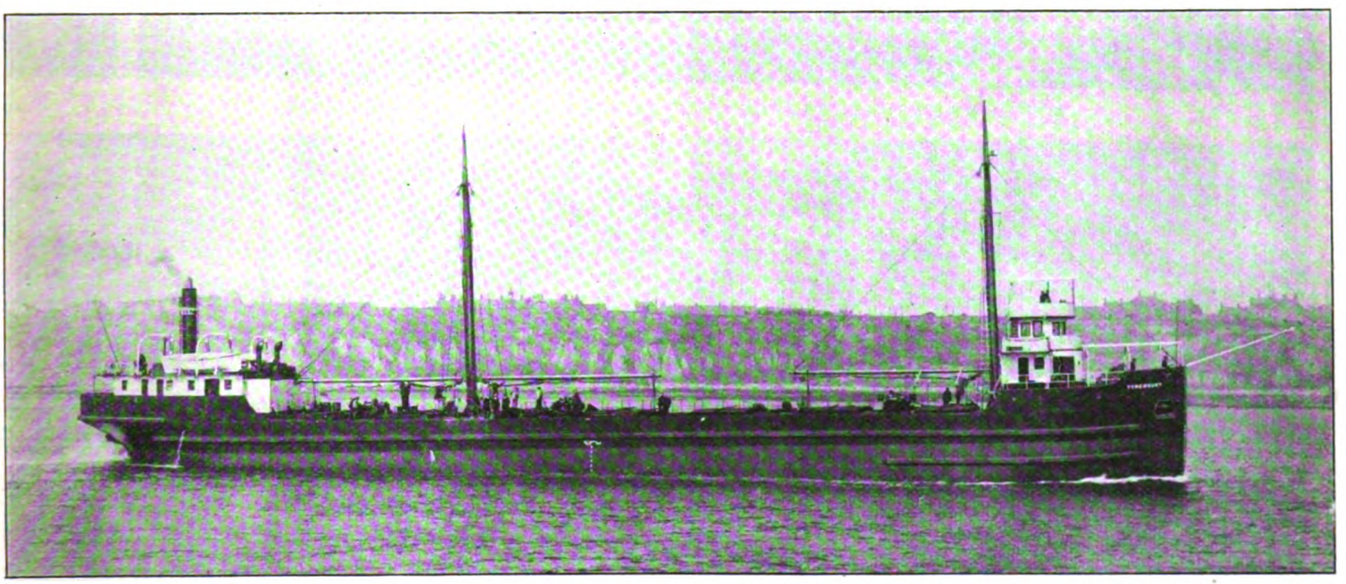
By Frederick C. Coleman

THE Tynemount, an electrically-driven cargo vessel, recently built by Swan, Hunter & Wigham Richardson, Ltd., of Wallsend-on-Tyne, England, to the order of the Electric Marine Propulsion Co., Ltd., Montreal, and for service on the Great Lakes and canals of North America, is illustrated in the accompanying drawings and photographs. The Tynemount is 250 ft. in length by 42 ft. 6 in. beam, and 19 ft. depth molded, and she is adapted to carry 2,400 tons of cargo. The vessel has two masts, forecastle and navigating bridge forward, and poop aft. There are one steel deck and three cargo holds, with seven large hatches. On the deck are steam winches for working the cargo with three 3-ton derricks.

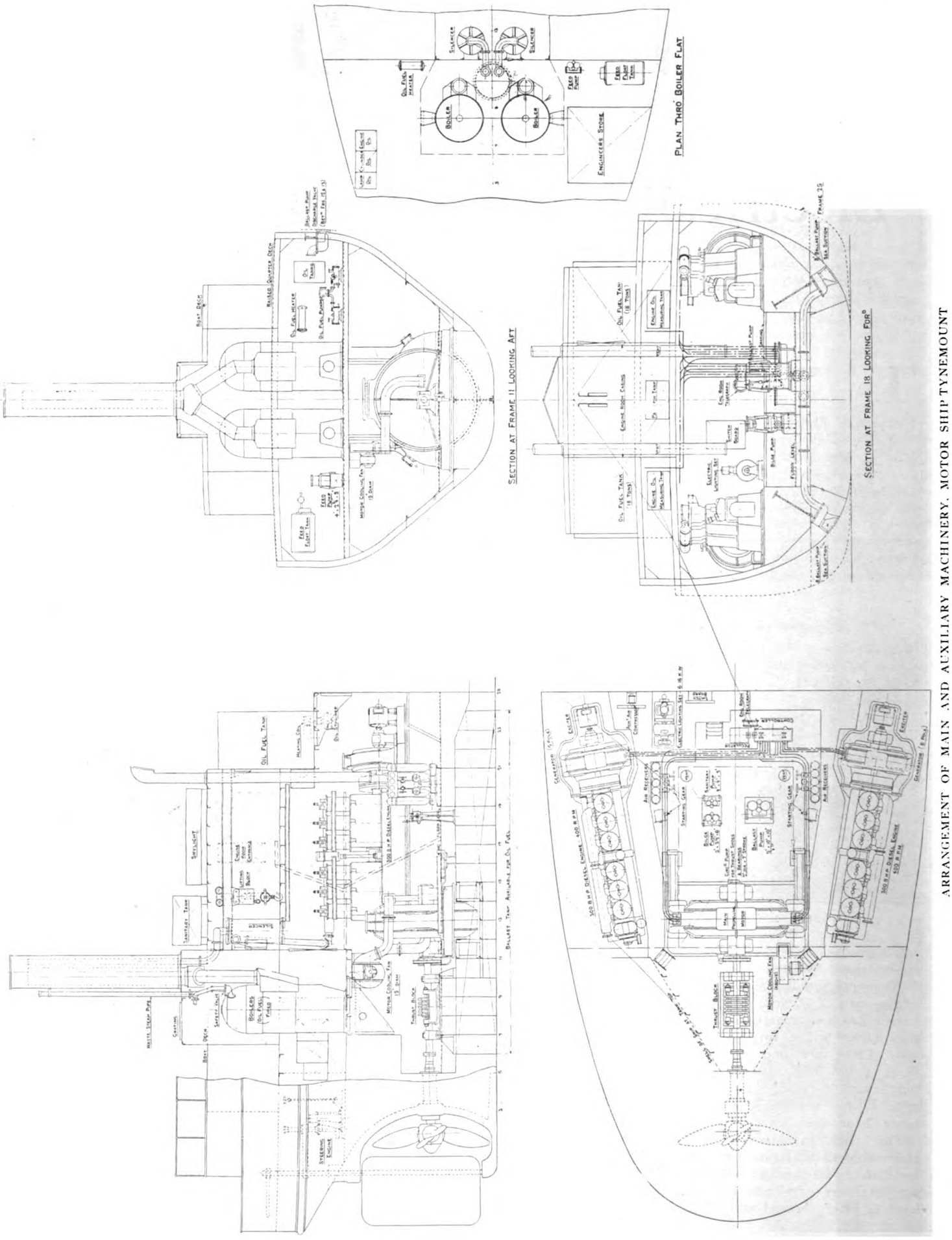
The deck machinery consists of steam windlass, steam steering gear, and the three steam winches for working cargo and warping. Electric light is fitted throughout. This auxiliary machinery is supplied with steam from two Cochran donkey boilers placed in the poop and fired by means of oil fuel. The vessel has a double bottom throughout, with heavy flush fitted tank top plating; under the cargo holds the double bottom is adapted for carrying water ballast, as is the forepeak, whilst the tank under the engine room and the after peak may be used for oil fuel. There are also two tanks for oil fuel on the deck forward of the poop bulkhead. In the forecastle is the accommodation for the officers, crew and oilers, whilst above are the captain's sleeping room and his office, together with wheelhouse, etc. In the poop are the rooms for the engineers, the galley, the dining saloon and the crew's mess room.

Among other special features may be mentioned a strong oak fender along the sides of the vessel and forward for protection in the locks, a strong oak quarter badging round the stern, "wrecking wells", *i. e.* vertical trunks to give access from the deck to the double bottom when the holds are full of cargo, bowsprit for steering, etc. The machinery is accommodated right aft under the poop.

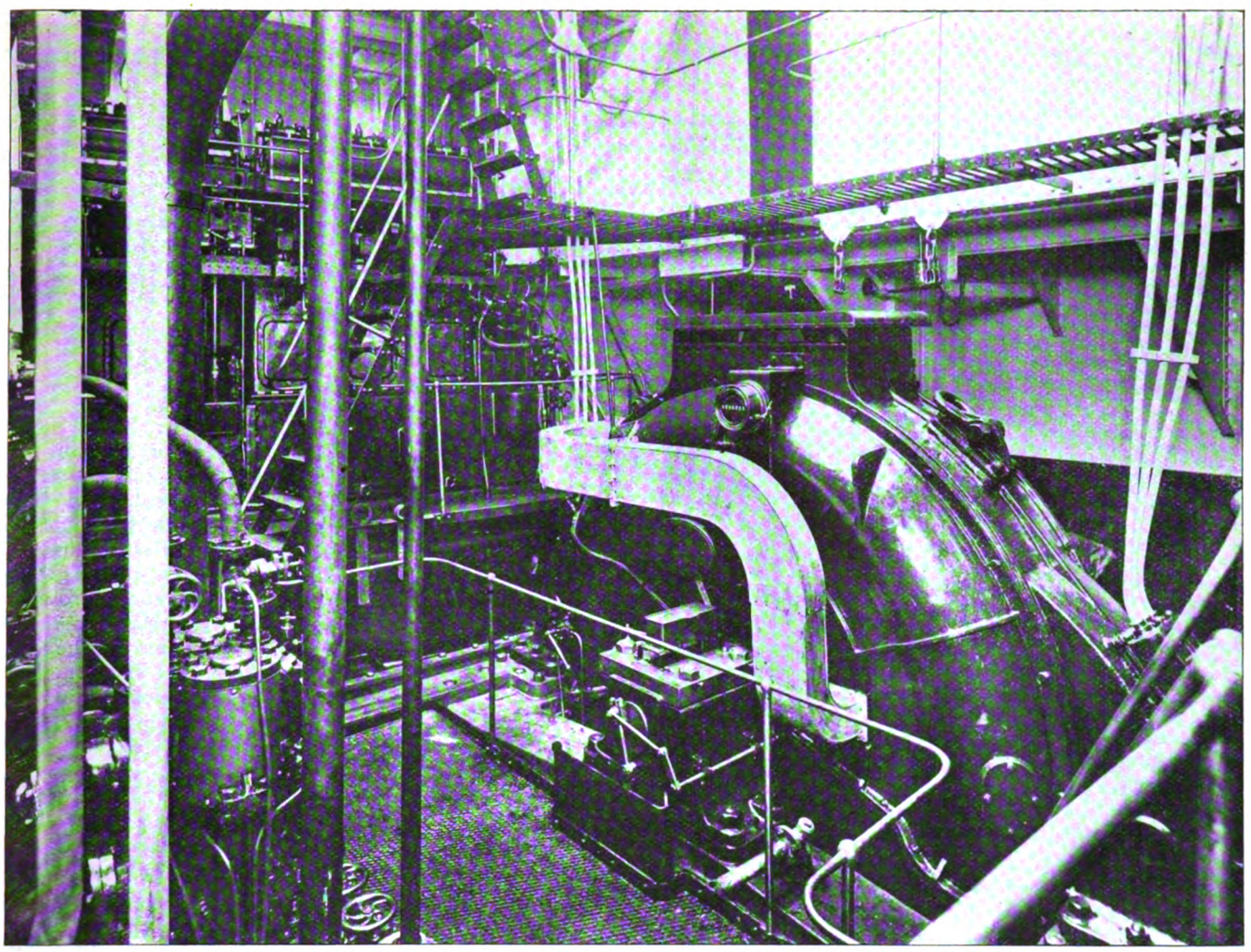
The system of electric drive is that designed by Henry A. Mavor, who has described the system and discussed its advantages in papers read before the Institution of Engineers and Shipbuilders in Scotland and before the British Association in 1911 and 1912, and jointly with John Reid, before the Institution of Naval Architects in June, 1913. The prime movers of the installation consist of two six-cylinder, high speed engines of the Mirrlees-Diesel type, as manufactured by Mirrlees, Bickerton & Day, Ltd., Hazel Grove, near Stockport, England. They are each capable of developing 300 B. H. P. at 400 R. P. M. on the four-stroke cycle,



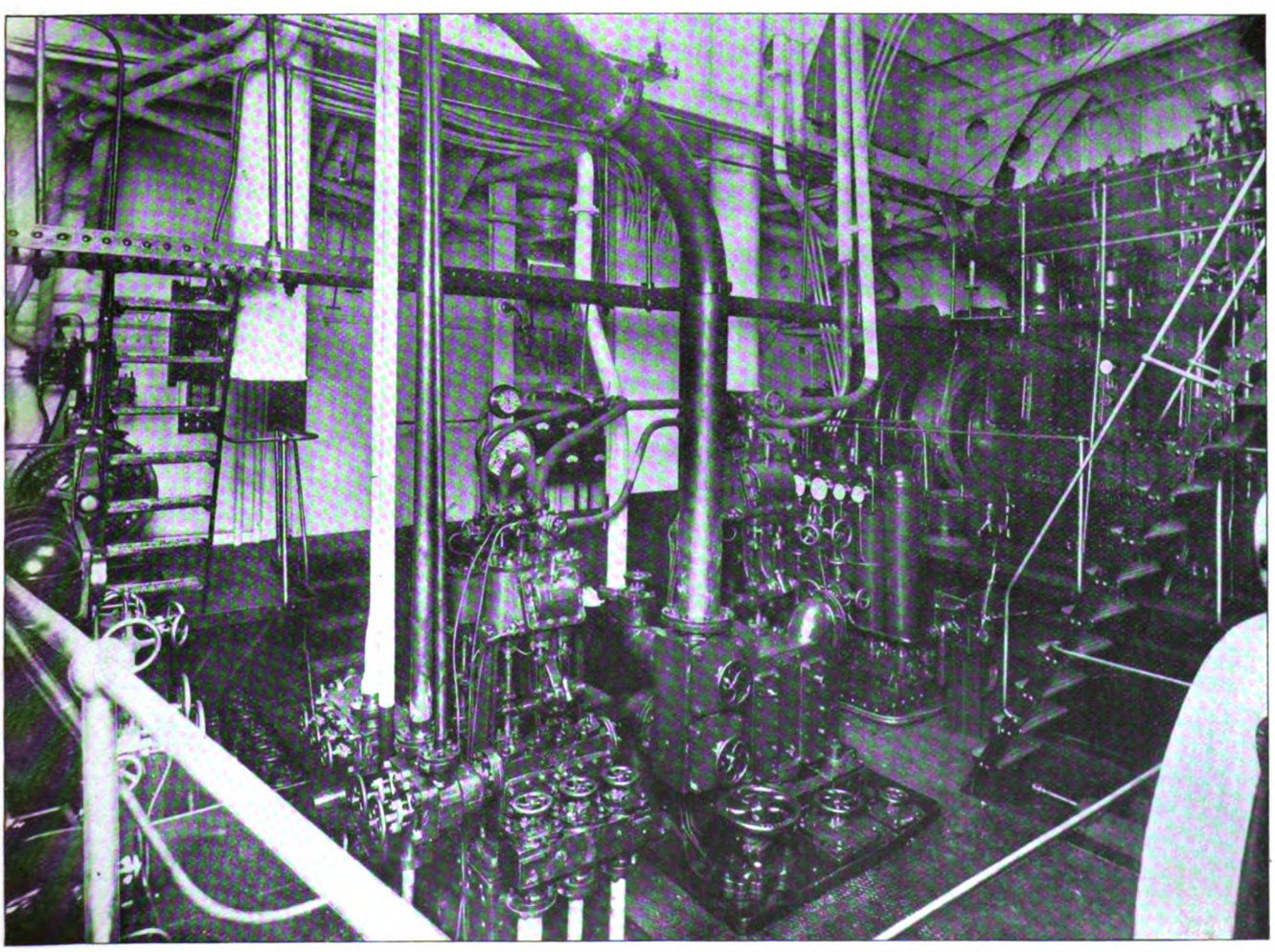
THE MOTOR SHIP TYNEMOUNT, THE FIRST MERCHANT SHIP TO BE ELECTRICALLY-DRIVEN



ARRANGEMENT OF MAIN AND AUXILIARY MACHINERY, MOTOR SHIP TYNEMOUNT



VIEW OF ENGINE ROOM LOOKING AFT, SHOWING PROPELLER MOTOR



VIEW OF ENGINE ROOM STARBOARD SIDE, SHOWING ONE GENERATING SET

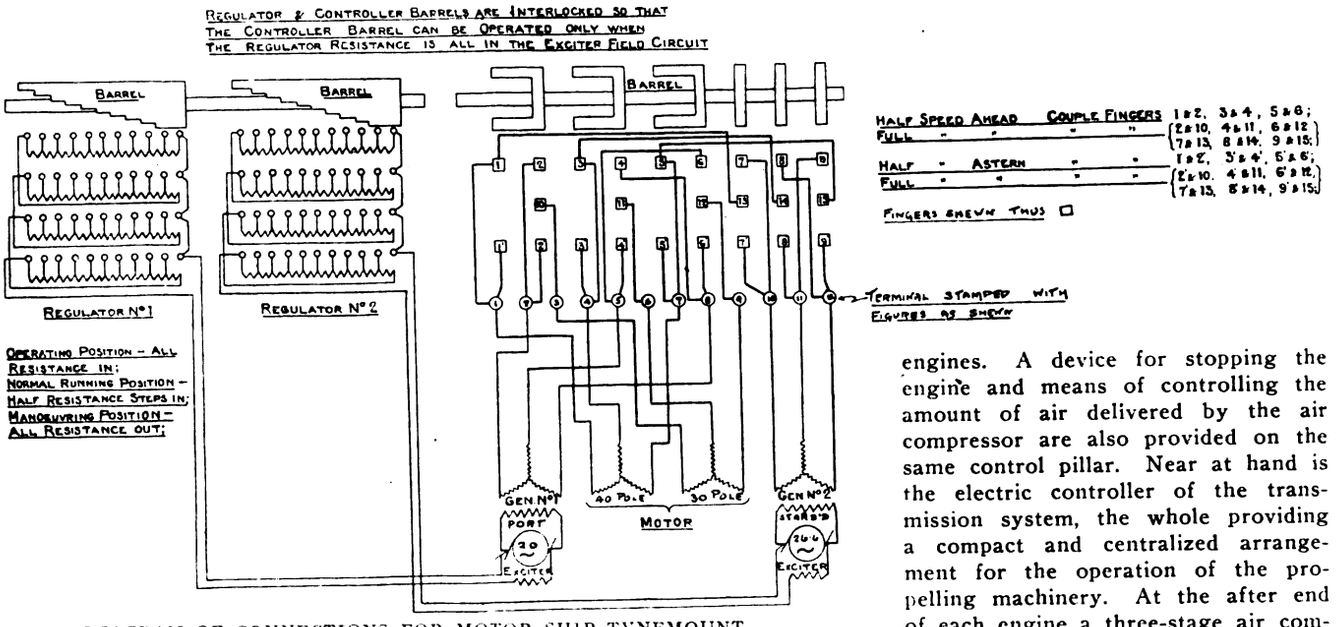
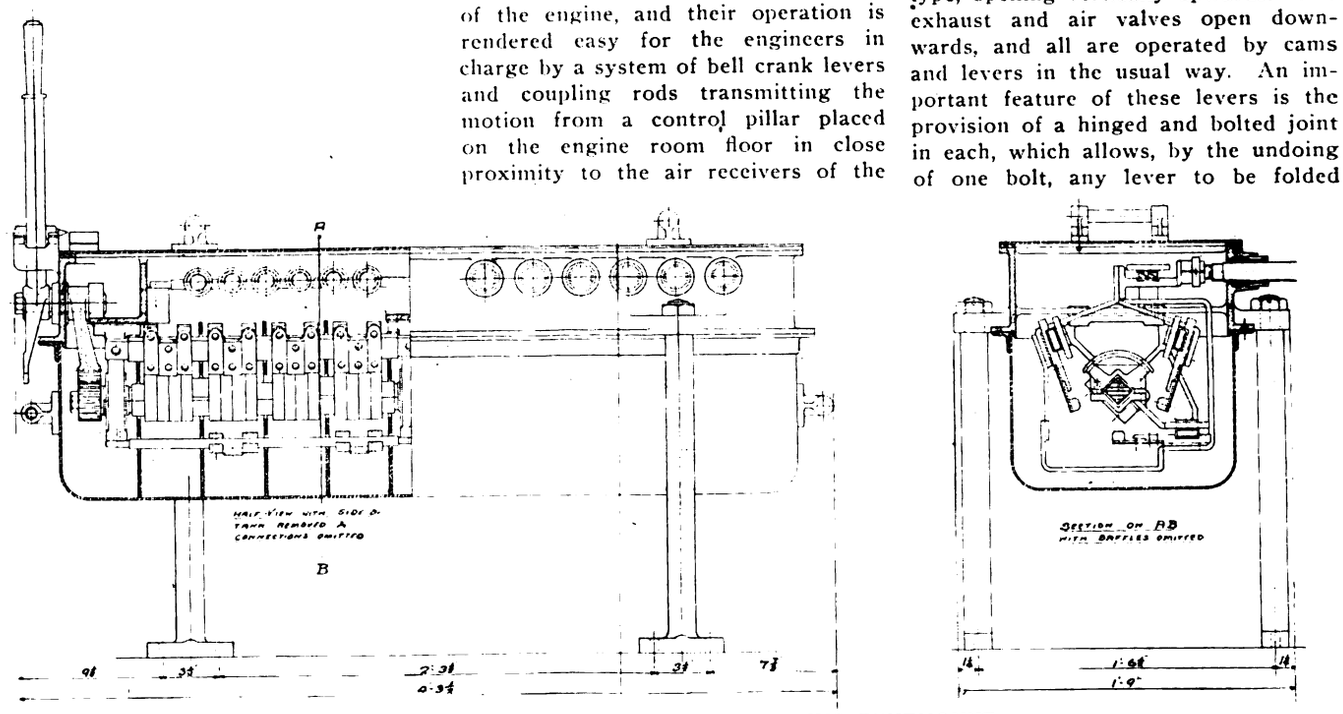


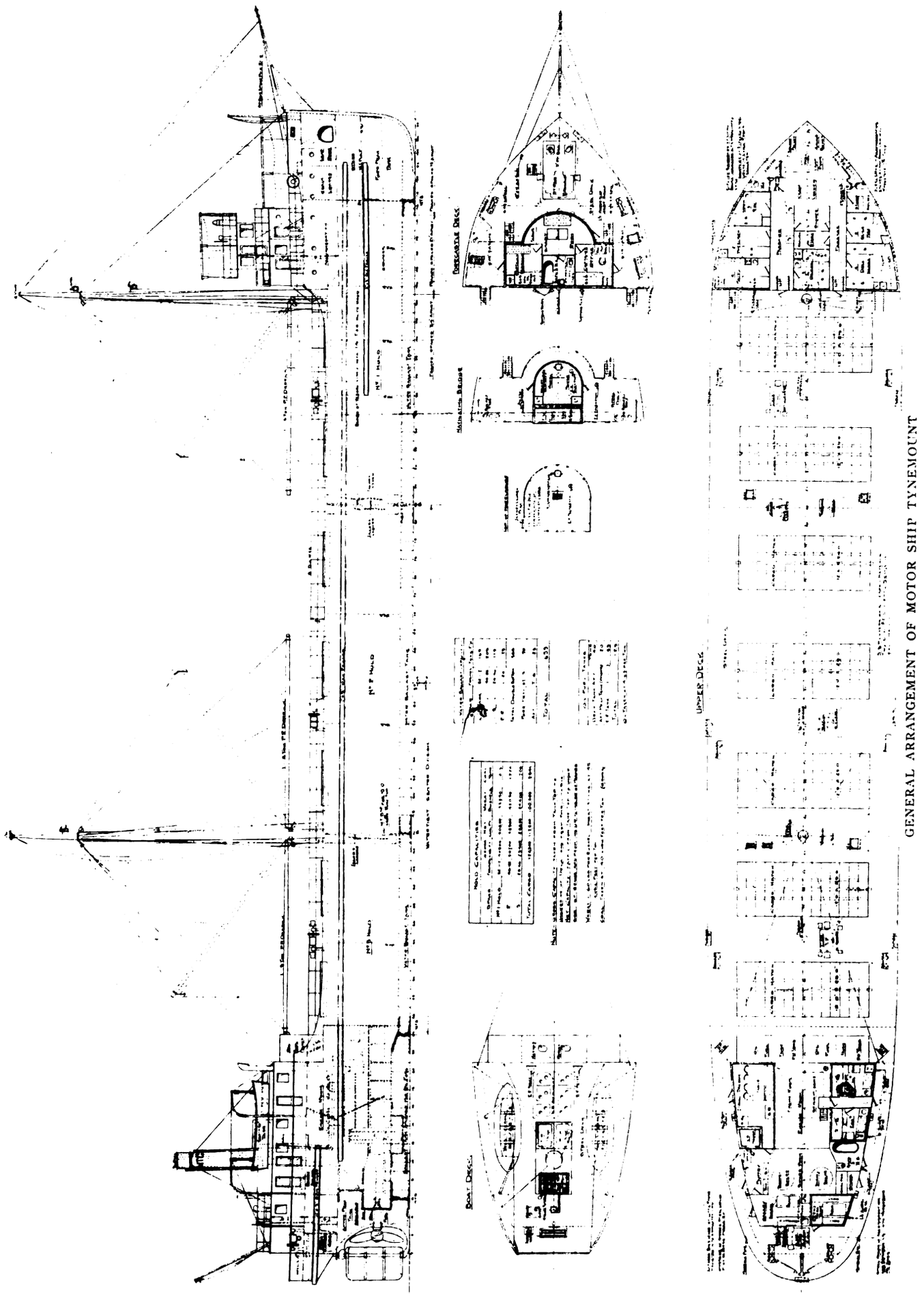
DIAGRAM OF CONNECTIONS FOR MOTOR SHIP TYNEMOUNT

the diameter of the cylinders being 12 in. and the stroke 13½ in.

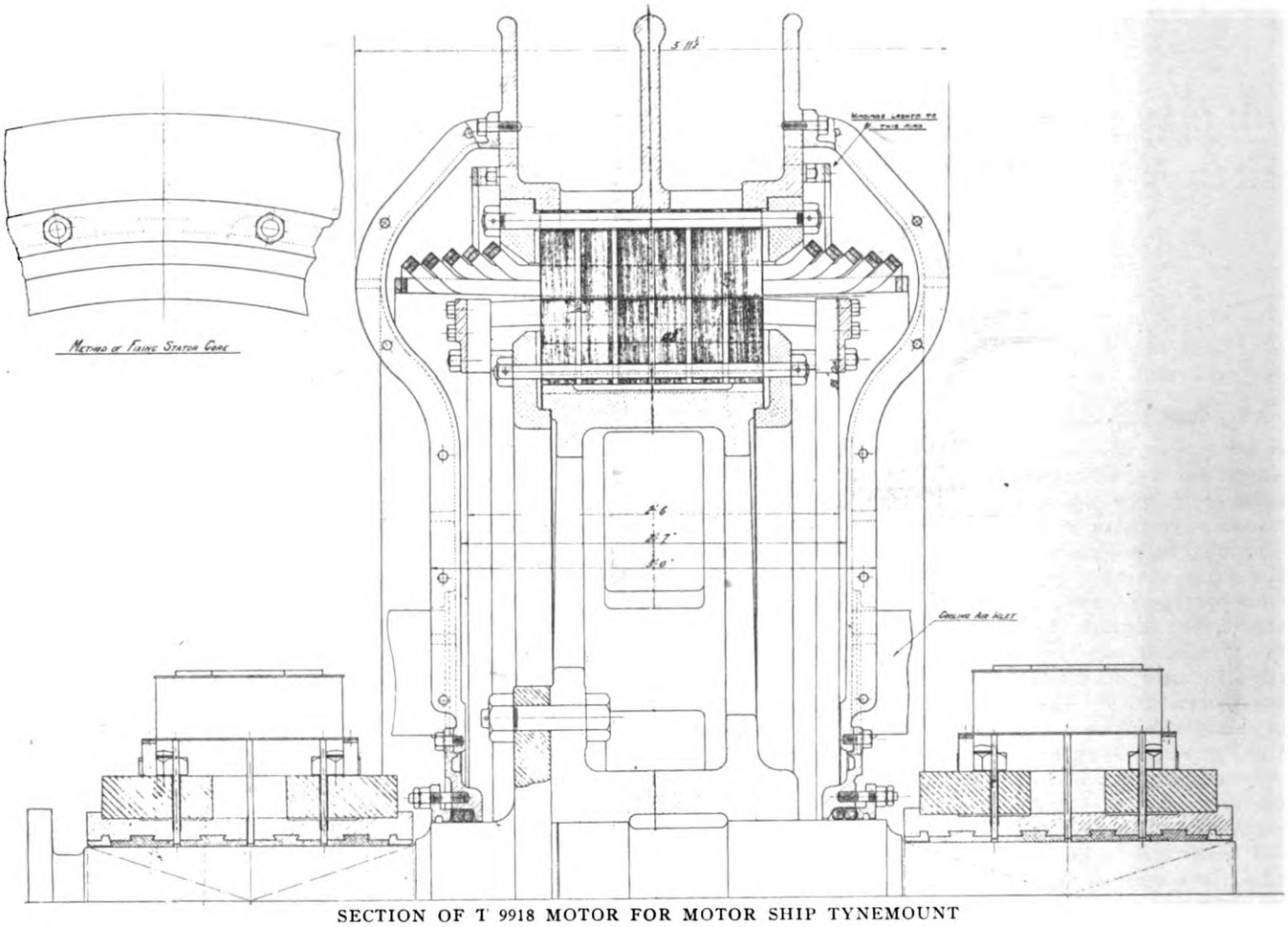
The engines are totally enclosed, forced lubrication being employed throughout. There is a substantial bed plate, cast in two pieces and bolted together, joined with the alternator bed plate at the flywheel end of each engine, the whole being secured to the raised engine seatings, which form part of the ship's structure on both port and starboard sides of the engine room. The six cylinders of the engine are divided into two groups of three cylinders each, the vertical shaft, which drives the cam shaft, being placed between the two groups. The crank shaft is made in two pieces, the gear wheel, which transmits the motion to the vertical shaft, being bolted between the two flanges of the central coupling and these flanges are turned solid with the shafts. The engines, which are coupled to the alternators in the usual manner, are placed on the forward end of the machinery space on the port and starboard sides. A suitable hand lever barring gear working in an internal rack on the flywheel of each engine provides for turning the engine when required into the starting position. Starting is effected by means of compressed air, three cylinders only being fitted with starting valves. These are arranged on the three cylinders at the flywheel end of the engine, and their operation is rendered easy for the engineers in charge by a system of bell crank levers and coupling rods transmitting the motion from a control pillar placed on the engine room floor in close proximity to the air receivers of the engines. A device for stopping the engine and means of controlling the amount of air delivered by the air compressor are also provided on the same control pillar. Near at hand is the electric controller of the transmission system, the whole providing a compact and centralized arrangement for the operation of the propelling machinery. At the after end of each engine a three-stage air compressor is fitted, driven direct from an extension of the engine crank shaft. This extension also provides means for driving the lubricating and circulating water pumps. The two groups of cylinders comprising each engine are carried by the two enclosed-type columns, each cast in one piece and provided with inspection doors of ample size. To these columns on the front or cam shaft sides of the engines cast iron brackets are fixed, which support grating platforms running along the whole length of each engine on the front side. These platforms provide easy access to the valve gear and valves. The valves are situated in the cylinder covers, the fuel valve being of the ordinary needle type, opening vertically upwards. The exhaust and air valves open downwards, and all are operated by cams and levers in the usual way. An important feature of these levers is the provision of a hinged and bolted joint in each, which allows, by the undoing of one bolt, any lever to be folded



ARRANGEMENT OF CONTROLLER, MOTOR SHIP TYNEMOUNT



GENERAL ARRANGEMENT OF MOTOR SHIP TYNEMOUNT

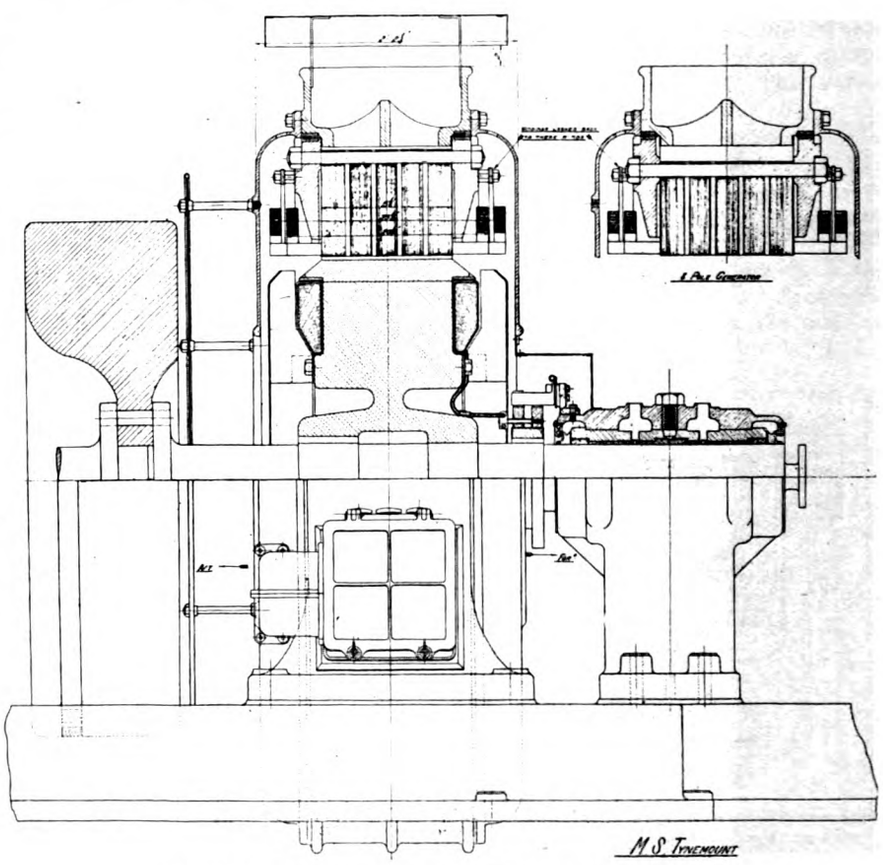


SECTION OF T 9918 MOTOR FOR MOTOR SHIP TYNEMOUNT

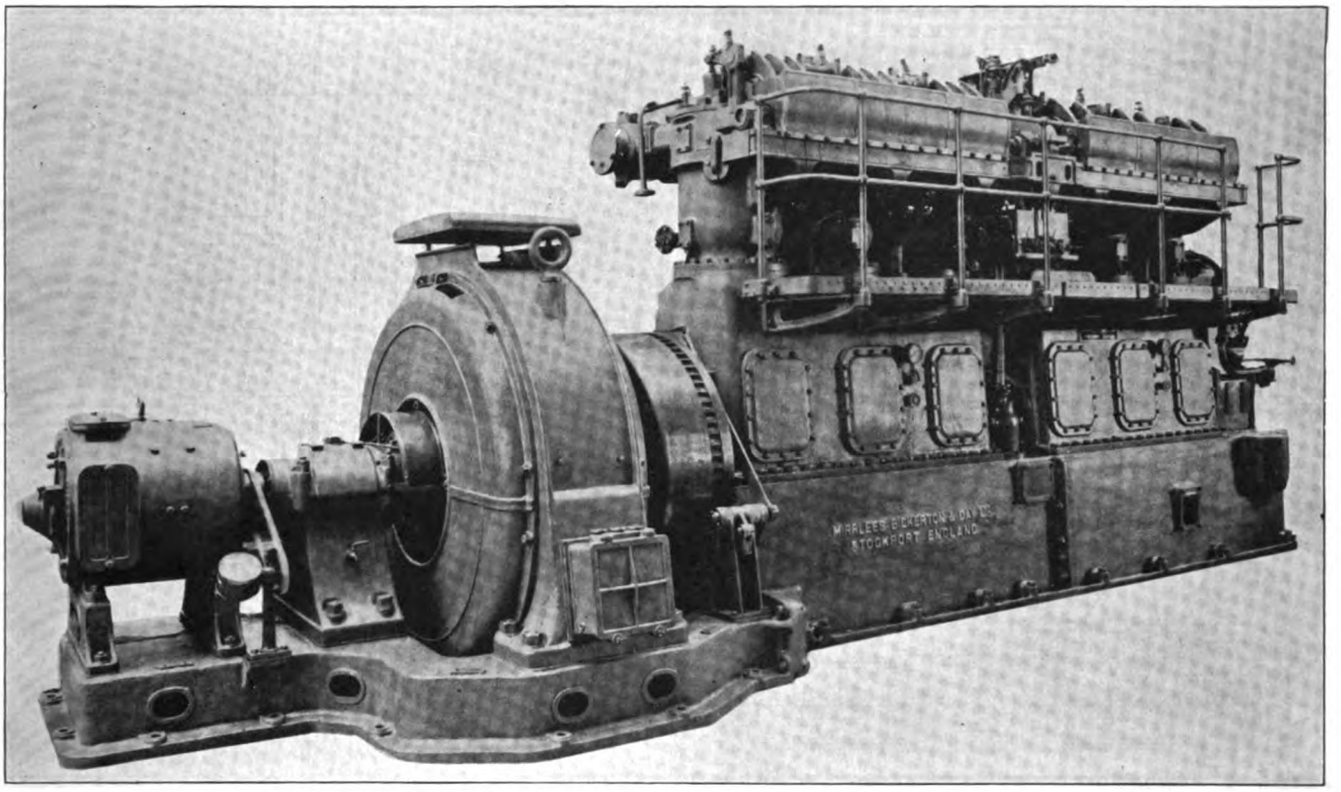
back and by this means the work of withdrawing the valves is reduced to a minimum. All the valve seats are made separate from the cylinder covers, and can be withdrawn bodily with the valves. Spare valves and seatings are carried, and thus all grinding-in can be done on the bench at the engineer's convenience. The pistons are of the truck pattern and have separate heads, and the top ends of the connecting rods are fitted with gun-metal bushes working on case hardened piston pins.

The fuel pumps for delivering the oil to the cylinders are situated on either side of the vertical shaft gear-casing, and are driven by eccentrics from the cam shaft. Each of these eccentrics operates a small cross-head to which are fitted the three plungers of each pump.

Fuel oil is fed by gravity to the fuel-pump suction chamber from the ready use tanks, which are situated on the forward bulkhead of the engine room. The amount of oil passing to the cylinders is determined by the governor, which is fitted on the upper portion of the vertical shaft, a system of coupling rods and levers is connected from the governor arm to a small spindle passing through the fuel-pump suction chamber and

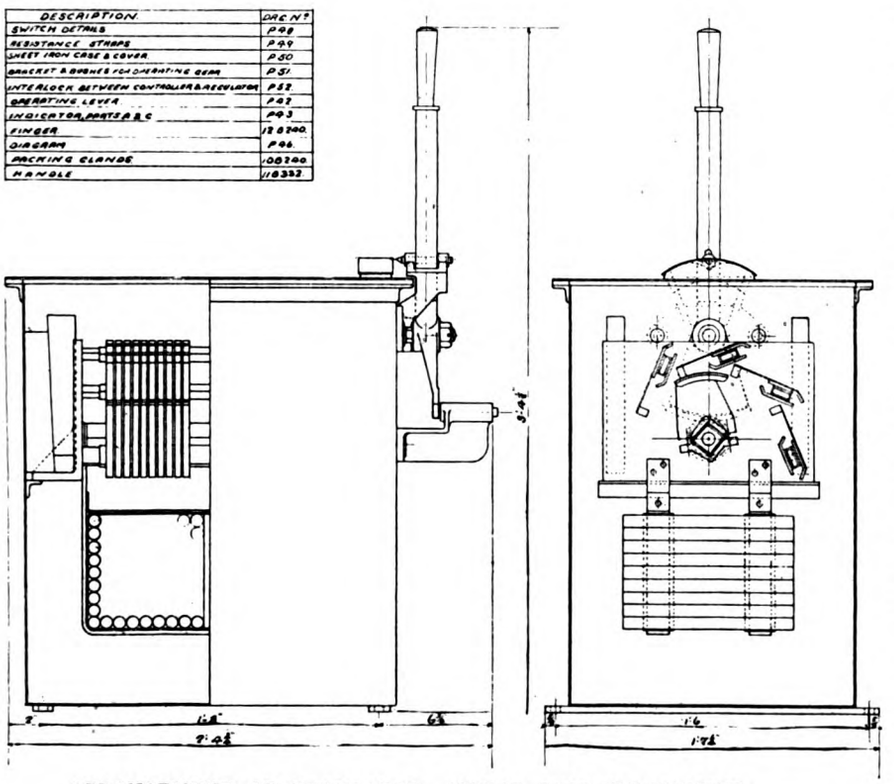


SECTIONAL ARRANGEMENT OF T 4413 GENERATORS



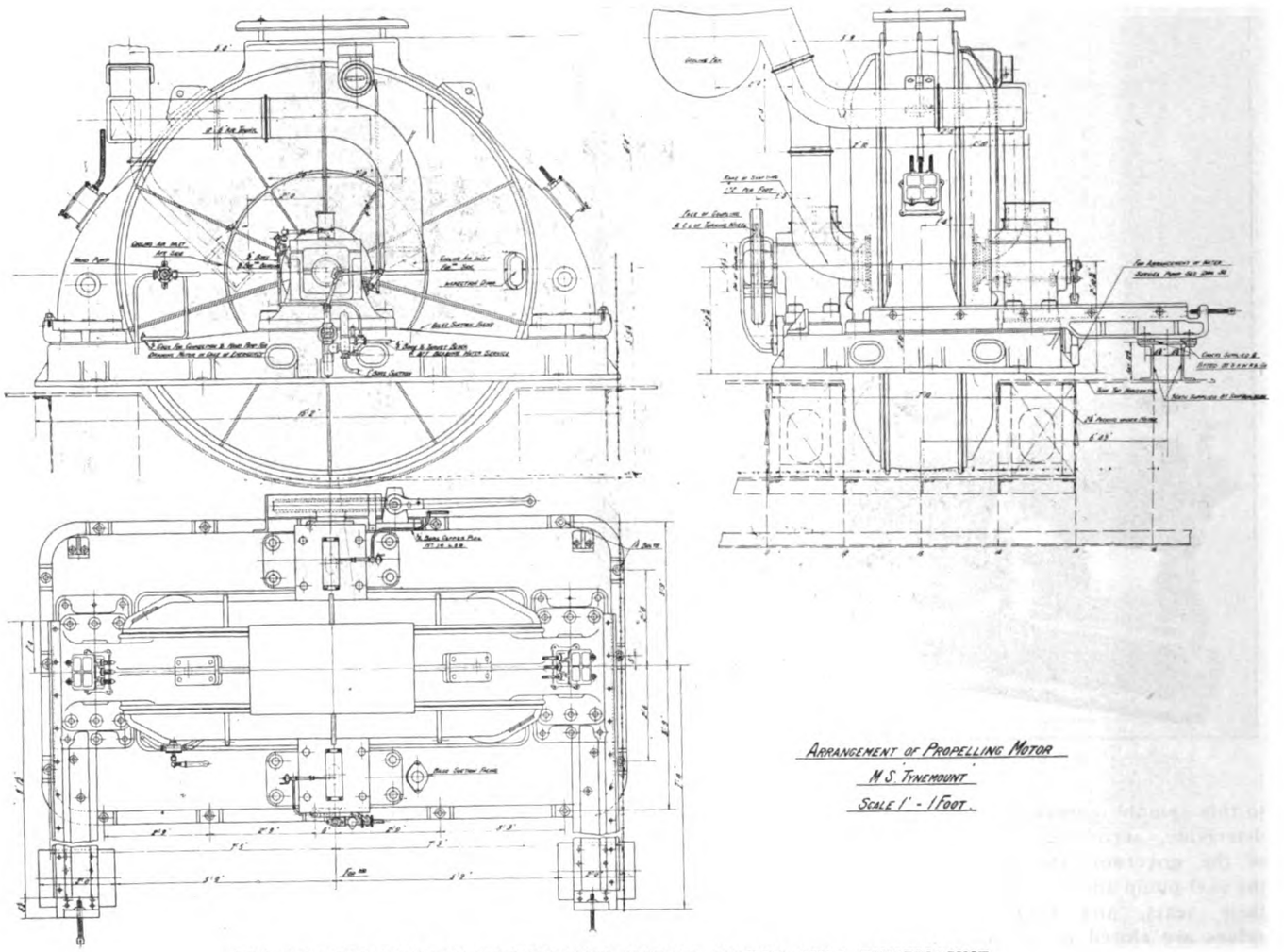
COMBINED GENERATING SET MOTOR SHIP TYNEMOUNT

to this spindle tappets are fixed, which determine, according to the position of the governor, the length of time the fuel-pump suction valves remain off their seats, and until the suction valves are closed no oil will be delivered to the fuel valves on the cylinder covers. The circulating water after passing through the engines goes to the exhaust pipes, which are water-cooled. Thence it passes from each engine through a water-flow indicator into a branch piece from which two pipes are led, one pipe going to the discharge valve on the ship's side and the other by means of a by-pass to the suction side of the circulating pump. By this means warm water can be mixed with the incoming water from the weed traps when the ship is sailing in cold waters. When the ship is running in fresh water, it will be possible by means of a special arrangement to pass the hot circulating water from one engine into the feed tank of the donkey boilers. When the engines have been stopped and are cooling down, it has been arranged that the sanitary pipes may pass circulating water through them and thus lessen the chances of precipitation of salts or alkaline matter in the jackets.



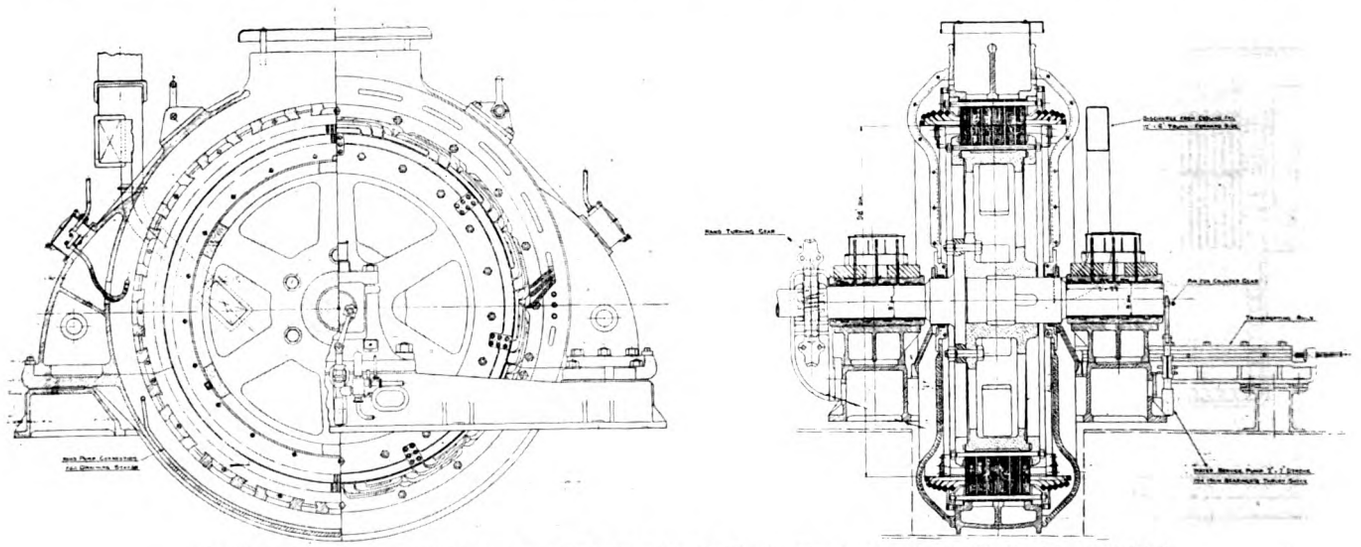
ARRANGEMENT OF REGULATOR. MOTOR SHIP TYNEMOUNT

The electrical equipment consists of two Mavor & Coulson three-phase alternators, each direct coupled to one of the Diesel engines. The alternators, when running at their normal speed of 400 R. P. M., each give an output of 500 volts and 270 amps. per phase, which absorbs the full power of the engine. They are provided with six and eight poles, respectively, making the frequency of the current 20 periods per second and 26.6 periods per second, respectively. An exciter is direct coupled to each alternator and is capable of giving an exciting current of 30 amps. for ample working, which can be increased up to 50 amps. whilst maneuvering. The current from these two generating sets is led to a 500-B. H. P. Mavor & Coulson patent induction motor of special construction. The rotor of this motor is of the squirrel cage type, but the stator is provided with two different and entirely sep-

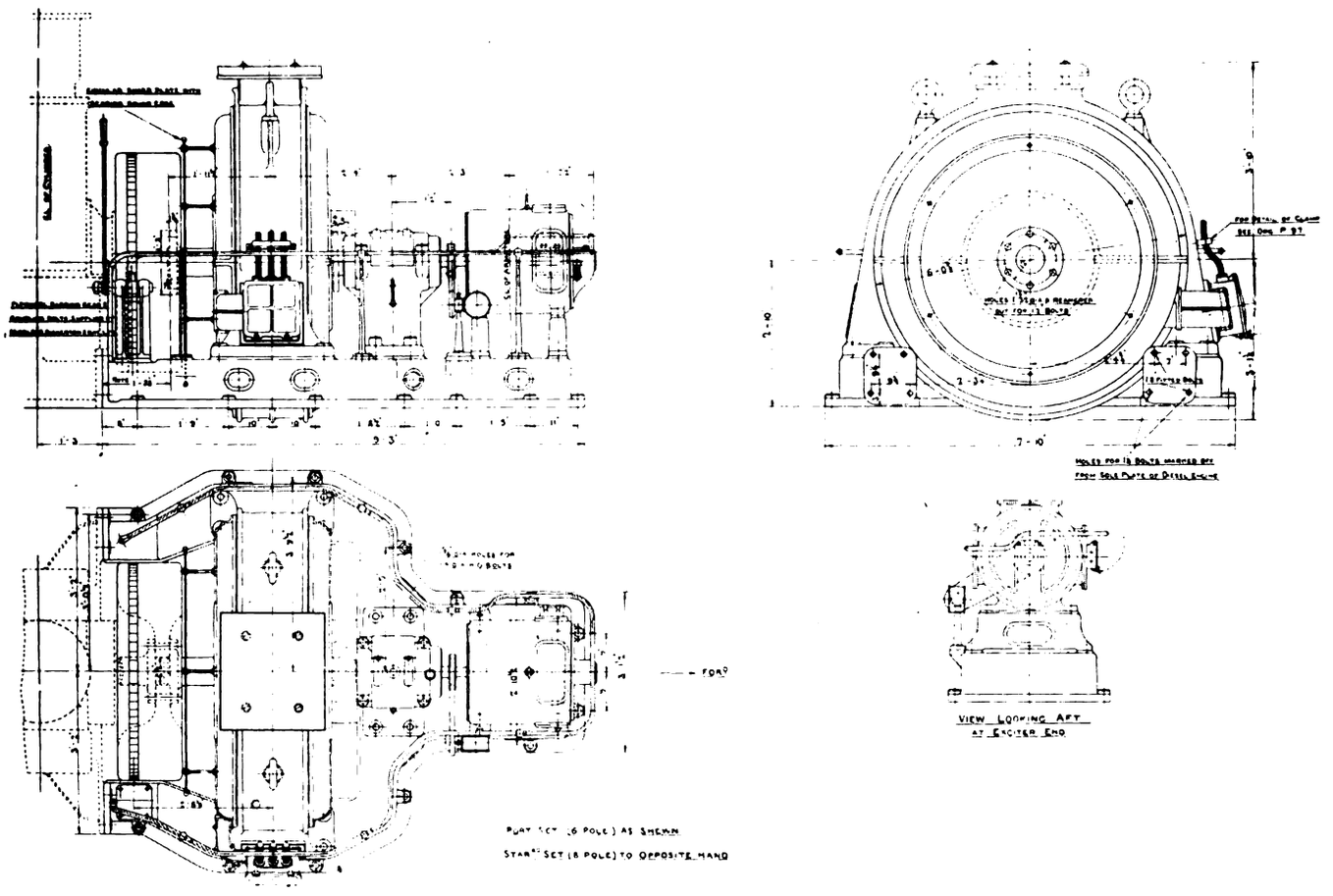


ARRANGEMENT OF PROPELLING MOTOR, MOTOR SHIP TYNEMOUNT

arate windings, one of 30 and the other of 40 poles. When these two windings are supplied with current at 20 and 26.6 periods, respectively, they give the same synchronous speed of 80 R. P. M. The motor will then absorb the full power of both engines and drive the propeller, to which it is direct coupled, at a speed of 78 R. P. M. This propeller speed corresponds to the fastest speed of the vessel. In order to obtain a slower speed the connections are altered so that the alternator giving 20 periods supplies the 40-pole winding of the motor; the alternator giving 26.6 periods can be shut down and the 30-pole winding of the motor is also out of use. The synchronous speed of the motor with the propeller is now reduced to 60 R. P. M. One of the engines only is available, but as the speed of the ship is reduced to about three-quarters of the normal, half of the total horsepower is ample and the great advantage is obtained of being able to entirely shut down that part of the plant which is not required at the low speed. It will be noted that the two alternators,



SECTIONAL ARRANGEMENT OF PROPELLING MOTOR, 500 S. H. P., 78 R. P. M. LOADED



ARRANGEMENT OF GENERATOR AND EXCITER, MOTOR SHIP TYNEMOUNT

when both are at work, are connected to entirely separate circuits, and they are, therefore, never run in parallel. The paralleling two alternators necessitating that they should be run up to speed and synchronized before being switched onto the load is quite unsuitable for ship work; this operation not only requires skill and care, but would involve considerable delay in starting the propeller motor. The motor is readily reversed by interchanging the connections of two of the phases. The switch gear, by means of which the necessary changes are made is extremely simple; it consists of two parts—a main switch of the tramway controller type, having five different positions, full ahead, half ahead, stop, half astern, full astern; and of a second switch, the purpose of which is to introduce resistance into the shunt circuit of the exciter. The contacts of both switches work under oil, but it is inadvisable that the contacts of the main switch should be required to break the large main current flowing to the motor. The two switches are, therefore, interlocked so that it is impossible to work the main switch except when all the resistance has been introduced into the exciter field coils. There is then practically no excitation and the whole system is dead. With the resistance in the exciter field circuit, the main switch can be moved to any one of its four working positions, and when the main connections have been made for the new running position, the shunt switch lever is pulled over so as to cut out the resistance and restore the excitation. Until the main switch is definitely on one set of contacts the shunt switch is locked so that the excitation cannot be restored. From an inspection of the switch gear and the diagram of connections it will be seen that the whole handling of the ship can be carried out by means of two levers which are so interlocked as to be practically fool-proof. In the present instance, these switches are in the engine room, but it is evident that by lengthening the connecting cables they could be placed on the navigating bridge. The number of electrical instruments provided has been kept down to a minimum. There are provided only one ammeter, and one voltmeter for each alternator and an ammeter and voltmeter for each exciter. The handling of the switch gear is so simple that there is no necessity for multiplication of measuring instruments. The electrical drive permits the speed of the ship to be altered without altering the engine speed. It also permits a convenient gear ratio to enable the engines, and the propeller, respectively, to be run at their most efficient speeds and also provides for the steady reversal of the propeller while the engines continue to run in their normal direction. In addition to the above advantages, it is found that in many cases the system allows of a reduction in the machinery space and also in the bunker space required, thus increasing the cargo capacity of the vessel. As a subsidiary advantage, it lends itself readily to distant control and in any case where it may be found advisable the switch gear can be put on the bridge and the control of the motor driving the propeller be put into the hands of the navigating officer.

It has been some years since there has been an exhibition of the progress made in ship building and marine engineering, and for that reason special interest obtains in the exhibition scheduled to be held in London from Sept. 25 to Oct. 17, 1914, inclusive. Olympia, the second largest exhibition hall in the world, has been secured for the purpose. The exhibitions will be sectionized under the following headings: Naval engineering, shipping exhibits, fisheries exhibits, general marine exhibits and general engineering. The headquarters of the management are at 104 High Holborn, London, W. C., England.

Steam Yacht Cyprus

A Fine Craft Which Has Just Been Built on the Pacific Coast for D. C. Jackling

THE steam yacht Cyprus, building for Daniel Cowen Jackling, Salt Lake City, Utah, from designs of Cox & Stevens, New York, was launched from the yard of the Seattle Construction & Dry Dock Co., Seattle, Wash., on Sept. 24. The Cyprus was christened by Miss Mildred Bone, daughter of Scott Bone, editor of the *Seattle Post-Intelligencer*. Miss Bone, after the ceremony, on behalf of the owner, was presented with a necklace of diamonds and pearls.

Mr. Jackling, the owner of the yacht, is the president of the Utah Copper Co., and is interested in various other large copper companies. He is regarded as one of the foremost authorities on metallurgy in the United States, and has held positions of professor of metallurgy in several western colleges.

The dimensions of this new yacht are:

Length over all	230 ft.	6 in.
Length on water line	215 ft.	0 in.
Beam	28 ft.	0 in.
Draught	12 ft.	6 in.

This vessel has many striking features, Mr. Jackling having imposed upon his architects the task of securing for him a vessel combining an unusually high maximum speed with the greatest possible accommodation for her dimensions, it was further required that the vessel should have a steaming radius of at least 4,000 knots cruising speed, and should be suitable for extended ocean cruising in heavy weather with comfort and safety to those on board.

Steamer Type of Hull

Having these requirements in mind, Messrs. Cox & Stevens decided upon the steamer type of hull as possessing many advantages over the conventional yacht type, in which the long overhanging bow and stern add absolutely nothing to the seaworthiness of the vessel or of its accommodation. The architects further decided that in order to enable this vessel to maintain a high speed at sea, it was better to adopt the double deck type and accordingly the plating has been carried right up to the upper or shade deck, a feature which permits of unusual accommodation on the main deck.

The design shows a very handsome vessel with straight stem and elliptical steamer stern, the freeboard being ample, the sheer pleasing, and the finished vessel with its large stack placed nearly amidships, two military masts arranged for wireless and its two deck houses of steel on the upper deck will, when finished, present a most workman-like and attractive appearance.

An inspection of the lines shows a form that should be admirable both for speed and seaworthiness, there being a moderately sharp entrance and a very easy run aft, considerable dead-

STEAM YACHT CYPRUS

rise to all the sections and a pronounced flare above the waterline forward, which will tend to keep the vessel very dry under all conditions.

The hull is built throughout of heavy steel in excess of the Underwriters requirements for vessels of this class, and to insure the maximum possible safety from collision, special attention has been paid to the matter of watertight subdivision. There are nine transverse watertight bulkheads, built of heavy plating; there is a complete double bottom, extending the full length of the vessel, and in addition both forward and aft of the machinery space, a heavy, watertight deck has been worked, very largely adding to the safety of the ship. The space beneath these watertight decks is utilized for stowage of fuel, water and other stores.

The form of hull decided upon has made it possible to secure an unusual amount of accommodation for the owner, his guests, and for the crew of the vessel, this having been still further increased by the adoption of two four-cylinder, triple expansion engines, using oil as fuel, steam being supplied by a battery of Babcock & Wilcox's boilers of the most approved type, these boilers being particularly suited for oil-burning.

Oil as Fuel

The use of oil as fuel, while common in war vessels and in merchant ships, is practically a new development in yacht design. The adoption of twin screw propulsion and oil fuel not only largely reduces the amount of space assigned to machinery department, but also made possible a considerable reduction in the engine room force.

The fuel oil, of which the vessel has a total tankage of some 260 tons is carried in carefully constructed tanks formed by structural watertight bulkheads and the vessel's plating, the oil being carried partly in a large thwartship tank between the boiler room and engine room, and partly forward and aft in hold tanks under the watertight decks. All of these tanks are very thoroughly subdivided by swash bulkheads and are provided with all the most approved appliances for ventilation, filling and emptying.

No expense has been spared in construction, the owner's instruction being to produce a vessel that would have every possible convenience for himself and guests, and especial care has been taken in laying out the accommodations to produce the utmost possible comfort.

The outfit of auxiliaries is most complete, including an elaborate electric light plant with sufficient capacity to light the entire vessel, including two large searchlights and illuminating belt, and to operate a powerful wireless outfit, there being storage batteries of ample capacity to take care of lighting the ship when the

dynamo is not running. The vessel is steam-heated throughout, and an elaborate system of interior telephone communication has been provided for, plumbing is of the very best, supplying hot and cold running, fresh and salt water, and a large cold storage plant has been provided, making it possible to keep provisions for a long cruise in warm climates.

The hold space aft is given up to fuel tanks, water tanks, and certain store rooms, while in the forward hold, there has been arranged a most complete system of store rooms so that the vessel can store up for extended cruising.

On the lower deck forward, a very considerable portion of the space has been given up to cold storage space, there being separate rooms for meats and vegetables, and in addition on this deck are owner's store rooms, including wine lockers, space for dry stores and provisions for the crew.

On the lower deck forward of these staterooms are arranged four staterooms, each with two berths, providing accommodation for the cooks, stewards and waiters, these rooms having adjoining them a separate toilet room, each room having in addition to the berths, a bureau, lockers, transom seat and wash basin. Forward of the steward's and guests' quarters on the lower deck is the lower forecastle, providing berthing and messing accommodations for six oilers and firemen and 12 sailors, the deck force being separated from the engine room force, and each having their own toilet room.

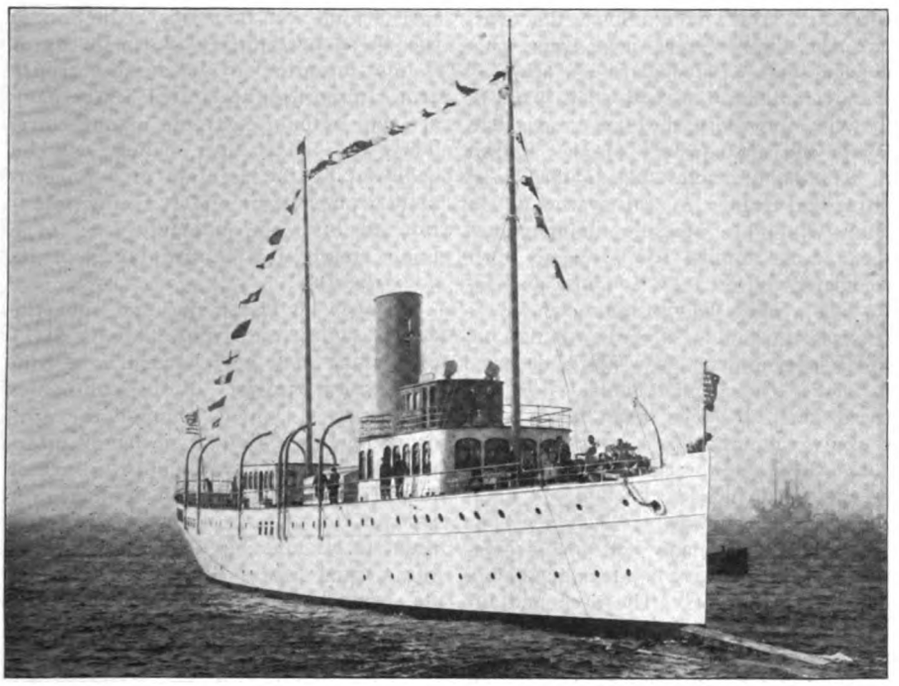
The accommodation for the rest of the crew consists of officers' quarters in the upper forecastle, where there are five separate staterooms, comfortably equipped with accommodation for all the officers of the ship with the exception of the captain, who has his own room and toilet in the pilot house and the chief engineer, who has a room on the main deck abreast the engine room enclosure, the officers' quarters having a large and comfortable wash room with shower bath and all conveniences.

With the exception of a small portion of the main deck taken up by the officers' quarters, the entire space on this deck is utilized by the owner and his guests and is arranged as follows:

At the extreme forward end of this space is a large, double-bedded stateroom, extending the full width of the vessel with a bathroom adjoining, this room being equipped with two bureaus, a large sofa and two hanging wardrobes. The beds in this room, as in the case of all other staterooms on this deck, being massive mahogany beds of special design. These staterooms are all finished in Colonial style, with massive mahogany furniture and doors, the bulkheads, ship's side and overhead being finished in ivory white. The bathrooms are all tiled on the floors and also have a wainscoting of tiling, all the fixtures being nickel-plated and the finish, where not tiled, being of white enamel.

A passage leads on the center line aft from this stateroom, and on each side of this passage are two extremely large staterooms, each having a full size wooden bed, sofa, dressing table and bureau, the baths being arranged between each pair of staterooms and the wardrobes for the staterooms being set into the bathrooms, thus leaving the staterooms unusually wide and clear. Aft of these staterooms and bathrooms comes a boiler enclosure, on the port side of which is arranged a galley, officers' mess room and laundry, also a bakery and a drying room. On the starboard side abreast the boiler room enclosure is a passage, finished in teak, and this passageway communicates with the forward quarters on the main deck, and has a lobby, where companion stairs lead up to the upper deck to the dining room.

This passage at its after end leads into the music room, which is a large compartment, 21 x 26 ft., and extending the full width of the vessel, finished in Java teak, handsomely panelled with furniture to correspond, and having overhead a very handsome dome skylight, so arranged as to give a very beautiful lighting effect in this room. The music room has at the after end a piano, on the port side two large sofas arranged in the corners so that card tables may be set up conveniently, and on the starboard side another large sofa. In order to make this room especially attractive, an unusual feature has been adopted; the openings on the side instead of air ports, being large plate glass windows, the lower portion being fixed for safety and the upper arranged to open, thus giving splendid ventilation and light.



STEAM YACHT CYPRUS, BUILT BY THE SEATTLE CONSTRUCTION & DRY DOCK CO., SEATTLE, WASH., FOR D. C. JACKLING, SALT LAKE CITY

The Passenger Quarters

Aft of the music room on the center line is the engine room enclosure, the chief engineer's stateroom being on the port side of this enclosure, also a large trunk room. On the starboard side of the engine room enclosure, the space is arranged as an entrance hall and gun room or armory, the main starboard gangway opening into this space and a hall running athwartships at the end of the engine room enclosures communicates with a similar gangway on the port side close by the trunk room.

From this hall a passageway leads aft to the owner's private apartments and one stairway leads down to the owner's and guests' quarters on the lower deck and another stairway leads up to the after deck house, which is arranged as a smoking room and has at its forward end a wireless room with berth for wireless operator. The owner's private apartment consists of a large stateroom on the port side with bathroom adjoining, the stateroom having a massive wooden bed, dressing table, bureau, sofa and large hanging wardrobe, opening aft, and adjoining the bathroom. On the star-

board side, opposite the owner's private quarters, is placed a stateroom for his secretary, with bathroom adjoining, and an office for the owner's use. The owner's quarters are finished throughout in selected Thibet oak, the bathroom being fitted as in the forward end of the vessel.

The passageway between the quarters of the owner and his secretary runs aft and opens into the library, which is the full width of the vessel and 22 x 16 ft. in size. This room is finished throughout in Thibet mahogany and contains, in addition to numerous book shelves, two large divans, a desk, writing table and a number of comfortable lounging chairs. This room has over it a small dome skylight and the windows are arranged in the same way as those in the music room.

Comfortable Deck Space

Aft of the library the side plating of the vessel is cut away for a considerable distance above the bulwarks, leaving an open space across the deck, covered, of course, by the upper deck, having a large and comfortable upholstered seat running around the stern of the vessel and two large upholstered seats running across the vessel at the forward end. This part of the ship will be most attractive, being perfectly protected from the weather and at the same time open to the fresh air and cool at all times.

The companion stairs mentioned above lead from the hall at the after end of the engine room enclosure to the lower deck aft landing in a hallway on the center line of the ship. On each side of this hallway are two very large guests' rooms, with bathrooms between, each having bed, sofa, bureau, dressing table and ample hanging space. These rooms are finished throughout in Colonial mahogany furniture and doors with ivory white elsewhere. On this same deck and aft of the guests' quarters, accommodation is provided for four servants with their own bathroom and also large store room for stowage of linen, pressing tables and all conveniences necessary for the use of the owner's servants.

The owner's dining room is placed in a large steel deck house on the upper deck forward of the smoke stack and accessible from the lobby in the passage on the main deck, this room being finished on the inside with very handsome selected India teak, the furniture consisting of a massive sideboard at the after end, a serving table on the starboard and on the port side, and four corner glass and china cabinets. This steel deck house contains, in addition to the dining room, a large pantry at its after end connecting by dumbwaiter to the galley, which is located below. On the starboard side, opposite the pantry, there is a deck toilet.

The pilot house, reference to which has already been made, is placed directly on top of the forward deck house, the top of which is arranged as a navigating bridge to be used in good weather by the captain or by owner and his guests.

A summary of the accommodations of the owner and guests shows that this vessel has 11 masters' rooms, six masters' bathrooms, all so arranged that their occupants may pass from one room to the other, to the music room, library, dining room, smoking room and after deck space, without going out into the weather, all of the rooms being large in size and comfortably arranged. This is certainly an extraordinary achievement in a vessel of the given dimensions.

In addition, the quarters for the officers and crew are excellent, the quarters for the different men being subdivided, and each department being in easy communication with that part of the ship for which they are responsible. While the arrangement of the interior is remarkably successful, another most attractive feature of this yacht is her immense and practically uninterrupted shade deck, running from stem to stern, completely covered by awnings and affording a most delightful promenade.

Mention should be made of the unusual speed which this vessel is designed to make, namely, 17 knots. For this speed her full boiler and engine room capacity will be utilized, consumption of fuel will be considerable, but at cruising speeds in the neighborhood of 14 knots she will be remarkably economical on account of her length and fine proportions, and will have a steaming radius of over 4,000 knots. The deck and life saving equipment of the Cyprus is unusually ample, as she carried on each quarter a large life boat, and in addition, three large and portable launches, one of these being a high speed boat, and the other two heavy substantial launches, one being for the owner's use and the other for the service of the ship. In addition to these boats, the complete equipment of life preservers and all other appliances for safety required by law will be supplied.

Armor Plate Controversy

The armor plate controversy has been finally settled as far as battleship No. 39 is concerned. The Midvale Steel Co. has been given the entire contract by Secretary Daniels, of the Navy Department, which bid $14 less for each of the three classes of plate used than the three previous identical bids of the Midvale, the Carnegie and Bethlehem steel companies, which were rejected. The original bids were $454 per ton for Class A plate, $518 for turret plate and $496 for Class B plate. In its second bid the Midvale Co. scaled its price by $14, the Bethlehem Steel Co. by $10 and the Carnegie Co. by $7. Secretary Daniels figures that by readvertising he has saved the government $111,875. He adds that by seeking really competitive bidding for battle ship No. 39 the Department has already saved $378,261 on structural steel, $19,000 on medium sized plates, $3,000 on angle bars and $102,000 on the casings for the big turbines, making a total of $502,261. Adding the amount saved on armor plate the total amounts to $614,136.

The secretary says that this showing is not what it should be and believes it offers an argument at once for the government to be engaged in the manufacture of armor plate. He says:

"I consider that the fight has only just begun and that this reduction is the mere preliminary skirmish, as it is my intention to eventually secure armor plate for the United States navy at the actual cost of manufacture. This, it is my firm belief, can be achieved by the erection of a government armor plant and it is my intention to lose no opportunity to urge upon congress the advantages of its construction."

It must be borne in mind that the actual saving on armor plate is $111,875, which may be regarded as a concession on the part of the companies to Secretary Daniels. Should the government ever establish an armor plate-making plant, it will find its armor plate costing more than it has ever paid to any private company. The real point to be considered is as to whether the United States is paying more for its armor plate than other nations. The figures prove that it is paying even less.

Steps have been taken by Secretary Daniels, of the navy department, to provide an adequate supply of fuel oil at a reasonable price. Owing to the increased demand for oil, the price has been increasing rapidly until the secretary fears that it will reach a point that will seriously interfere with the development and use of the internal combustion engine. Moreover, the Bureau of Steam Engineering has been steadily extending the use of oil burning boilers. The secretary will probably recommend to congress that a sufficient sum of money be appropriated to operate the oil tracts in California which were set aside by order of President Taft for naval use. It is estimated that the tract contains sufficient oil to supply the needs of the navy for a period of 40 years.

Death of Dr. Diesel

The Untimely End of One of the World's Leading Engineers—His Achievements

DR. Rudolph Diesel disappeared from the Great Eastern Railway Co.'s steamer Dresden on her passage from Antwerp to Harwich, on the night of Monday, Sept. 29. He was traveling in company with George Carels and Herr Luckmann, chief engineer of the Diesel Co., the party being en route to London to attend a meeting of the Diesel engine manufacturers. They bade each other good night at their respective staterooms, but when the party came to disembark in the morning, Dr. Diesel not appearing, Mr. Carels sent the room steward to call him. It was then discovered that Dr. Diesel's bed had not been slept in, though his night clothing was laid out and his watch hanging from his traveling bag in such a position that he might see it without arising. As his landing ticket had not been surrendered, the conclusion was inevitable that he must have resumed his stroll after his companions left him the night before and by some mischance had fallen overboard. All doubts concerning his untimely end were set at rest a few days later, when his body was found at the mouth of the Scheldt.

Dr. Diesel was born of German parents in Paris in March, 1858, and commenced his elementary education in Paris schools. When the war of 1870 broke out, his parents went to England, and shortly after their arrival in that country, they sent their young son to Augsburg. After courses of study in the Augsburg technical schools, young Diesel entered the Munich Technical College, where he graduated in 1879 and became assistant to Professor von Linde. He then spent a short time in practical work at Messrs. Sulzer Bros. works, Winterthur, on leaving which he was appointed manager of the French company for the manufacture in Paris of the Von Linde refrigerating machinery.

Discovering a New Prime Mover

The deceased engineer had from his student days been engrossed with the idea of discovering a prime-mover having a much higher thermal efficiency than the steam engine, and in 1893 he described in his book, "Theorie und Konstruktion eines rationellen Waermemotors", the engine he had designed. A translation of the book was published the following year in this country. Dr. Diesel's theories attracted great attention in Germany and throughout the whole world, with the result that he was afforded financial aid by Messrs. Krupp and the Augsburg-Nuremberg Co., for the construction of an engine of the type he advocated. The first Diesel engine, a vertical stationary one, was built in 1893; this was on the four-stroke cycle principle, the piston driving the shaft by a piston rod and an external cross-head. The cylinder was not water-jacketed. A feature of this first engine was the low cam shaft, resulting in the provision of long rods for operating the valves. The starting storage chamber consisted of a wrought iron pipe having riveted flanges; there was no air supply pump, and the fuel was injected directly. This engine could never be made to run. It was driven by outside power, and at the first injection of fuel, as Dr. Diesel remarked, an explosion occurred, the indicator broke up, and pieces from it nearly killed the inventor. The occurrence showed, however, that pure air could be compressed to such a degree that it could ignite the oil fuel.

Diesel's Second Engine

The second engine, built immediately afterwards, had a water-cooled cylinder, and its cam shaft was fitted higher up; its main difference, as compared with the first, was in the provision of an air-supply pump for injecting the oil fuel. This second engine did not run to any extent, and its working was attended with much danger. With it, however, Dr. Diesel was able to obtain a few indicator-cards of the whole cycle. This engine confirmed the practical possibility, shown by the first, of igniting combustion by compressed air, which the inventor had shown to be theoretically possible.

The first reliable Diesel engine, the third attempt, was built on Dr. Diesel's designs by the Augsburg company in 1897, after the inventor had carried out a series of experiments over a period of four years with the second engine. The third engine was of the vertical one-cylinder stationary type on the four-stroke-cycle principle, developing 18 horsepower. The piston of this third engine was also connected to an external cross-head. A fourth single-cylinder engine was built by the Augsburg company in 1898; this embodied the features of the third, but developed 20 to 25 horsepower, and was the first Diesel engine to run on what may be styled commercial lines. It may be said to have fixed the type upon which all slow-speed stationary Diesel engines have been built since.

In a vertical stationary, single-cylinder engine, built in 1901, the external cross-head was abandoned, and a trunk piston was adopted. A large number of vertical four-stroke cycle engines were built shortly afterwards on this pattern, for powers ranging from 10 to 250 horsepower per cylinder; several cylinders were also combined together on the same shaft for powers ranging up to 1,000 horsepower. Their speed varied from 160 to 200 revolutions. A three-cylinder engine of this type, developing 500 horsepower, built by Messrs. Carels Freres, Ghent, was exhibited at the Liege Exhibition of 1905.

We may state, in passing, that a large number of British, Continental, and American firms took up the patents, and during the last decade Diesel engines have been built in considerable numbers. The inventor and these firms gradually improved the construction and working of the engines, and many interesting stationary types of very large powers can now be seen all over the world. Several of these were shown at the Turin Exhibition of 1911, there being among them a vertical, four-cylinder, two-cycle, 1,000 to 1,200-h. p. engine, built by Messrs. Sulzer Bros., of Winterthur, running at a speed of 150 revolutions; it was direct coupled to a three-phase, 6,400-volt, 80-ampere, 50-period alternator.

Vertical Type for Stationary Plants

Reverting to the four-stroke-cycle engines, the vertical type for stationary plants was adopted at the commencement, and it was adhered to exclusively for a period of about 10 or 12 years. The horizontal type on the four-stroke-cycle principle then made its appearance, the first engines of this type being practically of the same design as the vertical engines, but laid horizontally. The first horizontal Diesel engine was built by Messrs. Koerting, and in this all the valves were fitted in the cylinder-cover in the same way as obtained with the vertical type of engine. Improvements in the design were gradually carried out by the Augsburg-Nurnberg Co., who, among other Continental com-

panies, have built horizontal, double-acting, four-stroke-cycle tandem Diesel engines, having two and four cylinders. An early engine of this type, built by the said company, develops 400 to 500 horsepower for each of its four cylinders at a speed of 250 revolutions.

The Diesel principle was soon found to be most applicable to a two-stroke-cycle engine, scavenging being carried out with pure air, and not with a fuel-air mixture, there being thus no risk of premature ignition and no fuel losses. When last year Dr. Diesel put before the profession the history of his engine, he stated that the two-stroke-cycle was then, in 1912, on almost an equal footing with the four-stroke-cycle type, adding that this latter had a better combustion, more economical fuel consumption, and was simpler in its method of working. The four-stroke-cycle, therefore, remained the standard engine for medium-size stationary plants. The two-stroke-cycle engine, on the other hand, had smaller cylinders, and had come into favor for stationary plants of higher power; this latter engine seemed also to be, according to Dr. Diesel, the standard type for ship propulsion.

First Engine for Ship Propulsion

The first Diesel engine for ship propulsion was built in France, in 1903, by Messrs. Adrien Bochet and Frederic Dyckhoff, in conjunction with Dr. Diesel. This was a 20-h. p. engine, having two pistons working in opposite directions in one cylinder, on the four-stroke cycle; it was used for propelling a canal boat. This engine was followed by others built by Messrs. Sautter, Harle & Co., Paris, for propelling submarine boats; these latter engines developed several hundred horsepower. The first marine Diesel engines were not reversible; they drove electric generators, and this made it possible to reverse the direction of rotation of the propeller. The first direct reversing marine Diesel engine, working on the two-stroke-cycle principle, was built by Messrs. Sulzer Bros., Winterthur, in 1905, and was exhibited by them at Milan. The first four-stroke-cycle reversing marine engine—a 120-h. p., three-cylinder engine—was built by Messrs. Nobel Bros., St. Petersburg; the four-stroke-cycle engine, however, does not lend itself so readily to reversing as the two-stroke-cycle type, and there has been for some time a tendency to abandon it for ship propulsion, and to replace it by the two-stroke-cycle type of engine.

Many builders have been for the last two or three years contemplating the construction of Diesel engines of high power for the propulsion of battleships and cruisers. They have all commenced experimenting in the right way, building a single cylinder of between 1,000 to 2,000 h. p. for experimental purposes, the single cylinder working on the two-stroke-cycle principle, and being either single-acting or double-acting. In most cases the single cylinder, developing the larger power here referred to, has worked satisfactorily, but the trouble commences when coupling two or more of them on the same shaft. The problem is not yet solved, so far as is known; it is still being worked at, and it may be that marine engine builders, by showing the same tenacity of purpose as that which animated Dr. Diesel in the early years of his researches, will finish by solving the heavy Diesel marine engine problem, as he himself, in the early days, overcame the difficulties inherent to the new principle. On the other hand, and without detracting in any way from Dr. Diesel's merits and pluck, it should be added that experiments with engines having two, three and more cylinders, each developing about 2,000 h. p., involve very great outlay, and cannot be lightly undertaken.

The latest application of the Diesel engine is to traction on railways. The facts contained in this article are condensed from *Engineering*, London.

Supply and Transport Ships

The final step in the completion of the design of the supply ship and transport, at present known respectively as Supply Ship No. 1 and Transport No. 1, provided for in the naval appropriation bill, approved March 4, 1913, was accomplished when Secretary of the Navy Daniels signed and issued a circular inviting all shipbuilders, who have sufficient plant with which to construct these vessels, to submit competitive bids for their construction to be opened Dec. 20. These vessels will be the first of their type designed exclusively for their respective uses up to the present time.

The transport will be 460 ft. long, 61 ft. beam and 20 ft. draught. She will have a maintained sea-speed of 14 knots, and will be fitted to provide comfortable quarters for approximately 2,000 men, including about 100 officers. Stables will be provided for 32 horses. Large cargo holds will be fitted for transporting equipment and outfit for establishing an advance base for military operations, in case necessity should require.

The vessel is of the three-deck type, with a large and commodious superstructure amidships, and a deck house aft. The after house contains hospital spaces, which are necessarily extensive for this number of men. The superstructure contains the galleys, bakery and other messing spaces on the main deck, while on the higher levels are the staterooms, messrooms, bathrooms, etc., of the officers of the ship and the troops. The troops and crew are quartered on the troop or second deck.

Special consideration has been given to the boat outfit in order that ample seating capacity may be provided for every person on board. Motor boats and steamers for the towing of life boats have been provided. One of the steamers will be fitted with a wireless apparatus for communicating with the approaching vessels, in case of disaster. The lifeboats proper are of the folding type. Provision has been made for hoisting and lowering them by geared davits, and especial precautions have been taken to insure safety in launching. The large steamers will be handled by the vessel's booms.

The transport will be fitted to burn either oil or coal. She will be equipped with eight 5-in. guns, will have double bottom protection throughout her entire length and up the sides, abreast the engine and fire-rooms. She will be equipped with modern high power wireless apparatus, searchlights, signal apparatus, and facilities for the rapid handling of cargo.

The supply ship will be 400 ft. long, 55 ft. beam, and 21 ft. draught. She will be fitted with cold storage spaces for the transportation of refrigerated meats, cooled vegetables, and a large quantity of ice. This ship is designed to accompany a fleet of eight battleships, and to supply them with provisions for a period of two months.

She will be equipped to burn either coal or oil, will have a high power radio outfit, four searchlights, and facilities for the rapid handling of cargo. She will be provided with a towing engine for use in aiding disabled vessels of the fleet. Provisions will be made for the transferring, by her own pumps, of fuel oil from her tanks to those of other vessels.

On these vessels, especial consideration has been given to the living quarters provided for both crew and officers, in order that all possible facilities and comforts for the personnel, that are compatible with the conditions to be met, may be provided. The ships have been designed with high freeboard and stability such as to make them comfortable and seaworthy.

Fire on the Volturno

A Terrible Tragedy Which Has Many Important Lessons in it

THAT the wireless is the greatest life saving agency known to man was again demonstrated in the case of the steamship Volturno, of the Uranium Steamship Co.'s fleet, which caught fire in mid-ocean at 6:30 a. m., Oct. 9. As soon as Capt. Inch, of the Volturno, realized that the fire was likely to become a serious affair, he sent out wireless messages for help. The Cunard turbine liner Carmania was 78 miles away and Capt. Barr immediately headed his ship toward the Volturno's position, working the stokehold force double shift. Notwithstanding the fact that a violent gale was prevailing, the Carmania's speed was increased from 16 to 20 knots, reaching the stricken ship about at 11 a. m. A life boat was immediately lowered, but could make no headway in the mountainous seas running. In fact, the crew lost all but three oars and the officer in command had actually given up hope of reaching the Carmania again. Oars were thrown to them from the Carmania's deck and they were finally pulled aboard in an exhausted condition. Meanwhile Capt. Inch, of the Volturno, launched two boats, but they were both smashed and the occupants drowned. Two boats apparently got away safely from the ship, but were never seen again, though a day's search was made for them by the assembled ships.

Surrounded by Eleven Steamers

Practically every ship that caught the Volturno's appeal made for her position and before the day was out, she was surrounded by 11 steamers. It was characteristic of all of them that they immediately lowered boats as soon as they arrived, but none were able to reach the Volturno's side except a whale boat from the steamship La Touraine, which was nearly stove in by being thrown against the Volturno's side by a gigantic wave. The boats that were put out could rescue only those that could be prevailed upon to jump from the Volturno into the sea, but there were apparently few that had the courage to do this. Night came on with the burning vessel surrounded by giant liners, all of them unable to render any real aid, while they kept circling around the Volturno with their searchlights playing on the water in the hope of picking up anyone that might be in the water. Capt. Barr, of the Carmania, had been continually sending out wireless messages for an oil tanker, which was finally responded to by the Narragansett with the cheerful message, "Will be there with the milk in the morning," milk being the sea name for oil. The Narragansett arrived in the early hours of the morning and pumped liberal quantities of oil to windward of the Volturno, spreading a film over the waters, which made it possible for the small boats to operate. In a very few minutes thereafter every living thing was taken off the burning ship, Capt. Inch and the wireless operators being the last to leave. As is usual in such cases, the rescue of the passengers was marked with great deeds of individual skill and daring, many risking their lives to save others.

A Noteworthy Rescue

Especially noteworthy was the performance of Seaman Heighway, of the Carmania, who by the aid of a searchlight saw a man swimming feebly and jumped overboard to get him. The conduct of the officers and crew aboard the Volturno leaves nothing to be desired. The traditions of the sea were superbly upheld.

The cause of the fire is unknown. It apparently started in No. 1 hatch, soon setting fire to the forecastle and all the deck fittings. The flames gained so rapidly that the watch below was imprisoned and burned to death. A little later a series of explosions occurred, wrecking the saloon and the hospital amidships. It was then that Capt. Inch sent out his call for help and believing that the ship could not be saved, caused the life boats to be provisioned and swung out. Boats Nos. 13 and 5 were smashed in launching; No. 1 was successfully launched in the water, but capsized, being righted later by some of the crew; No. 6 was lowered and got away from the ship safely, but with No. 1 has not been seen since; No. 7 on being lowered was caught on the stern of the ship and completely wrecked. It was at this point that the Carmania's message was received and the attempt to launch life boats discontinued. Life belts were served out and adjusted to each passenger and they were informed that help was coming.

For a time Capt. Inch believed that he had the fire under control, but it was later found that the bunker was ablaze. It was impossible to stop the fire in the bunker on account of the gases, and the watertight doors were accordingly closed and water poured down No. 2 hatch onto the fire, but it continued to gain all the time.

As stated, the Carmania arrived at 11 o'clock and lowered a boat, which was unable to reach the Volturno on account of the high seas running. At Capt. Inch's request the Carmania then cruised about, looking for the two missing boats, but could not find them. At 3 o'clock the steamer Seydlitz arrived and lowered boats, but could not reach the Volturno. The Carmania then returned and tried to reach the Volturno with life rafts, but they all drifted past the bow, too far away to be of service. By dusk several steamers had arrived and the Kroonland lowered her boats, making four attempts to get alongside the Volturno, but each time failed.

At 9:30 p. m. the saloon and chart house of the Volturno were in flames. The decks, bridge and all the ship forward of the funnel were blazing fiercely and the pumps and dynamo had to be stopped for want of steam. At 11 p. m. the magazine on the bridge blew up, carrying away the aerial of the wireless equipment. Small boats were venturing as near as they dared to the burning ship and Capt. Inch was constantly inducing the passengers to jump. Many of them were timid about doing this, however.

Pouring Oil on the Water

At midnight the weather became overcast and squally and the work of rescue had to be suspended, as it was too dark for the small boats to see far. Capt. Inch withheld from the passengers the fact that the fire had begun to eat its way through the women's steerage to the after part of the ship, and fearing that the fire might burn through the deck before daylight, he spent the remainder of the night directing the crew in the making of small rafts to be used in case of necessity. Early in the morning the oil tanker Narragansett arrived and about 5:15 a. m. it was possible for the small boats to come alongside the Volturno, taking off about 400 in a very few minutes. By that time the fire had reached No. 3 hatch and the Volturno was well down by the bow with her screws out of water. Capt. Inch then abandoned the ship.

The vessels that responded to the appeal of the Volturno were the Car-

mania, Grosser Kurfuerst, Asian, Narragansett, Seydlitz, Minneapolis, Devonian, Czar, Rappahanock, and one other steamer without wireless. Each vessel took its quota of passengers and proceeded on their various journeys.

The terrible tragedy coming right before the International Conference on Safety at Sea, which is to be held in London next month, will undoubtedly be made a topic of consideration. This conference was called as a result of the Titanic disaster, frightful in its mortality, but as unlike the Volturno as anything that can well be imagined. The Titanic was speeding through a sea that was as quiet as a mill pond and in a night that was clear and star-lighted. Through an inefficient lookout she ran upon an ice berg, sustaining injuries, from which she sank 2 hours and 20 minutes later. There was absolutely no panic aboard the Titanic, as the passengers doubtless to a man believed that she could not sink. All her life boats with one exception were safely lowered and more passengers could have been saved had there been more life boats aboard. It is idle, however, to say that all of them could have been saved had there been life boat capacity for all of them on board, because it would have been impossible to have got them all in the water in time. A public demand rose, however, for sufficient life boat capacity for all on board and the leading liners today carry such an equipment.

It was pointed out at the time, however, that under normal conditions which prevail in the North Atlantic, life boat equipment is only of limited usefulness. In heavy weather almost insuperable difficulties are met with in launching them and in preventing their capsizing after they are launched. This view, emphasized by many architects, is borne out by the Volturno's experience. The real life boat is the ship herself and every provision should be made in the hull to minimize all forms of peril. A double skin and numerous athwartship bulkheads will lessen the seriousness of collision. Some system should also be evolved for the automatic detection and control of fires in their incipient stages. Unless a fire is the direct result of an explosion it usually has a small beginning and it is comparatively simple to nip it in the bud.

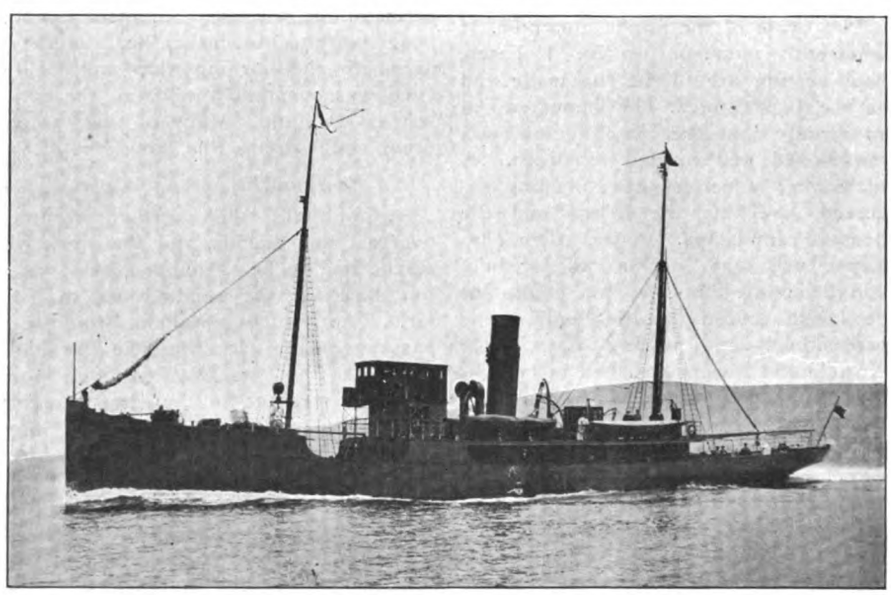
Canadian Fishery Cruiser

The Malaspina, Built in Ireland for Dominion Service

THE photograph illustrates the steamship Malaspina, the first of two fishery protection cruisers recently built in Ireland by the Dublin Dockyard Co., Ltd., for the Canadian government. These vessels, built to take the highest class in Lloyds Register of Shipping for both hull and machinery, are of uniform design, and each have the following dimensions:

Length between perpendiculars, 162 ft.; breadth, 27 ft; depth, molded, 13 ft. 11 in.

Of the flush deck type having machinery amidships, the Malaspina has a top gallant forecastle and long bridge or awning deck amidships, with commodious chart room at the forward end of the same, surmounted by the navigating bridge with navigating house and pilot's room thereon. Under the bridge deck forward are handsome apartments panelled in oak for the use of the captain and officers and members of the technical staff, as well as a commodious galley, pantry, lavatories and bath rooms. Under the after end of the bridge deck are situated the wireless office and the operator's rooms, and immediately below and under the main deck are the engineers' and officers' rooms, mess rooms and pantry, all of which are comfortable and well arranged. The seamen and firemen are berthed on the main deck forward, immediately under the forecastle deck in airy apartments, having attached bath room and lavatory accommodation on a much more generous scale than usual. On the lower deck forward, and entered by a companion way from the main deck are to be found the petty officers' quarters.



CANADIAN FISHERY CRUISER MALASPINA

Her Seaworthiness

Every consideration has been given to the question of seaworthiness, navigating facilities and life-saving appliances, and by transverse and longitudinal bulkheads the vessel has been divided into no fewer than 20 watertight compartments. On the bridge deck are four boats of large capacity, all lowered by mechanical power, and the motor launch is fitted under Welin's patent davits of 4½ tons capacity. There are the usual steam windlass, steam steering gear and steam warping winch. A complete electrical installation supplies light for the accommodation and hold spaces throughout, as well as the navigating lights, and a powerful searchlight is fitted on a small platform on the foremast and actuated from the after end of the forecastle deck from a point immediately behind the 6-pounder quick-firing Hotchkiss gun,

which is mounted on the forecastle deck. A refrigerating plant and cold storage accommodation by J. & H. Hall, Ltd., are installed on the lower deck forward and Marconi's wireless apparatus will be installed in due course, for which purpose the masts have been fitted of greater height than usual. Electric bells and steam heating and hot water systems are also included in the vessel's equipment. The machinery, supplied by David Rowan & Co., of Glasgow, has been built to a very high class specification, and consists of a set of powerful triple expansion engines supplied with steam at 180 lbs. pressure from a large marine type boiler worked under forced draught on the Howden system. All the usual contrivances for efficiency and economical working have been incorporated. The coal bunker capacity is sufficient for a radius of action under ordinary cruising conditions of about 6,000 miles while steaming nine knots.

The trials, which were carried out in accordance with admiralty methods, were of an exacting nature. The first day was occupied by the builders' trials, and on the second day, when the official trials took place, with the specified deadweight on board, the high speed of 14.7 knots was obtained as a mean of six runs on the measured mile and the revolutions corresponding to this speed were maintained during a six-hours' continuous trial at full speed. The guaranteed speed was easily exceeded and the engines worked with the maximum smoothness throughout, there being a total absence of vibration. We understand the throttle valve was not touched during these trials, and the feed pumps and all auxiliaries were maintained at their normal rate of working in service conditions. Records were taken at short intervals of the main engines, as well as all the auxiliaries, and at no time did the air pressure in the ashpits exceed 1¼ in. of water pressure.

The vessel passed through all trials without any mishap, and, as the deadweight, draughts, trim and stability are all satisfactory and in accordance with the guarantees given, there is every reason for believing that these fishery protection boats will prove eminently suitable for their special duty.

These two vessels have been built to the designs and under the direction of R. L. Newman, of Canada, the consulting naval architect for the Canadian government, and of his representative, F. L. Warren, of London.

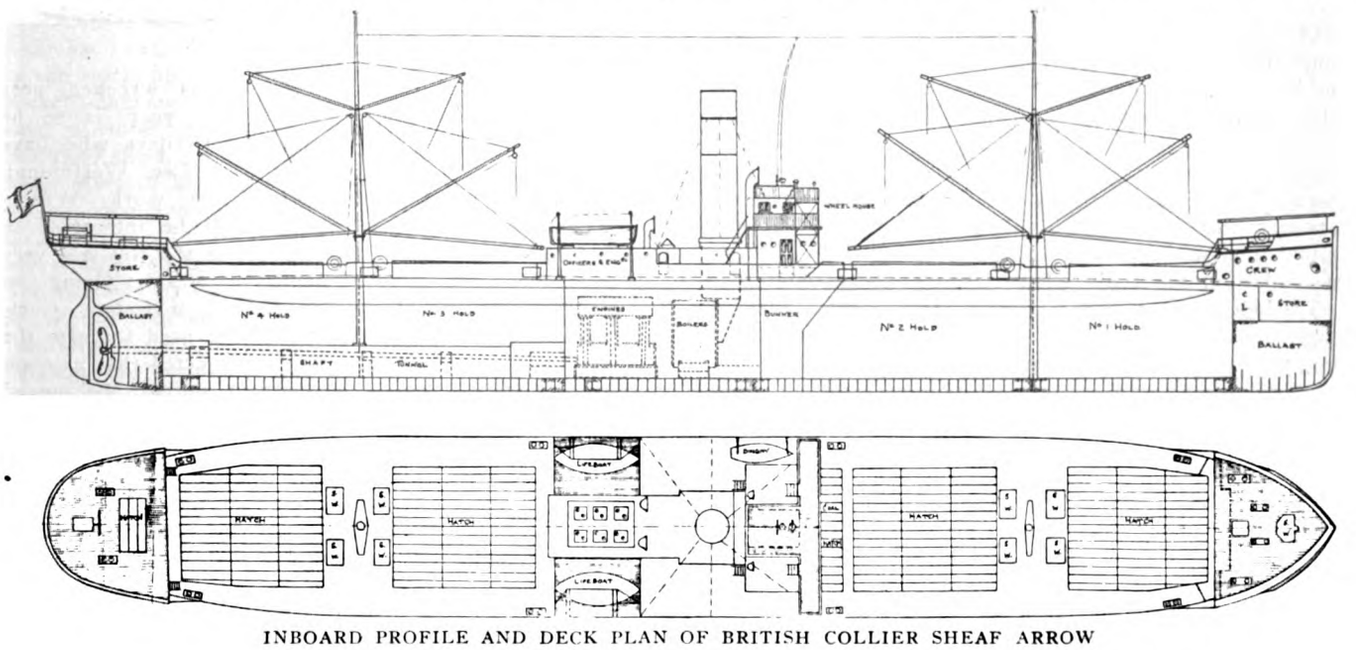
Type of British Collier

The Sheaf Arrow, Built on the Maxwell Ballard System of Arch Construction

AN interesting vessel which has recently been built is the Sheaf Arrow, which has been constructed by Swan, Hunter & Wigham Richardson, Ltd., of Wallsend, for W. A. Souter & Co., of Newcastle. The vessel has been fitted up to comply with the full British admiralty requirements for a fleet collier with extra-special gear and hull fittings necessary to comply with these regulations. It has eight special admiralty pattern steam winches, with quick running gear, double gaffs and double derricks to each mast with tables and outriggers, electric lighting throughout with electric Morse signalling. Special warping gear and extra powerful ballast pumping plant with winch, condenser and evaporator are provided.

Fig. 1 illustrates the general arrangement of this vessel, which is 279 ft. long, 40 ft. 3 in. wide and has 18 ft. 3 in. draft. Its dead weight is 3,150 tons, and its speed at sea when loaded is 12 knots. The engines are triple expansion with cylinders 23½, 39 and 64 in. diameter, the stroke being 42 in. Two boilers 16 ft. 6 in. x 12 ft. diameter are provided and the vessel throughout is of Lloyds 100 A1 classification.

A most interesting feature of the vessel is, however, that it has been constructed on a system of construction known as the Arch and shown



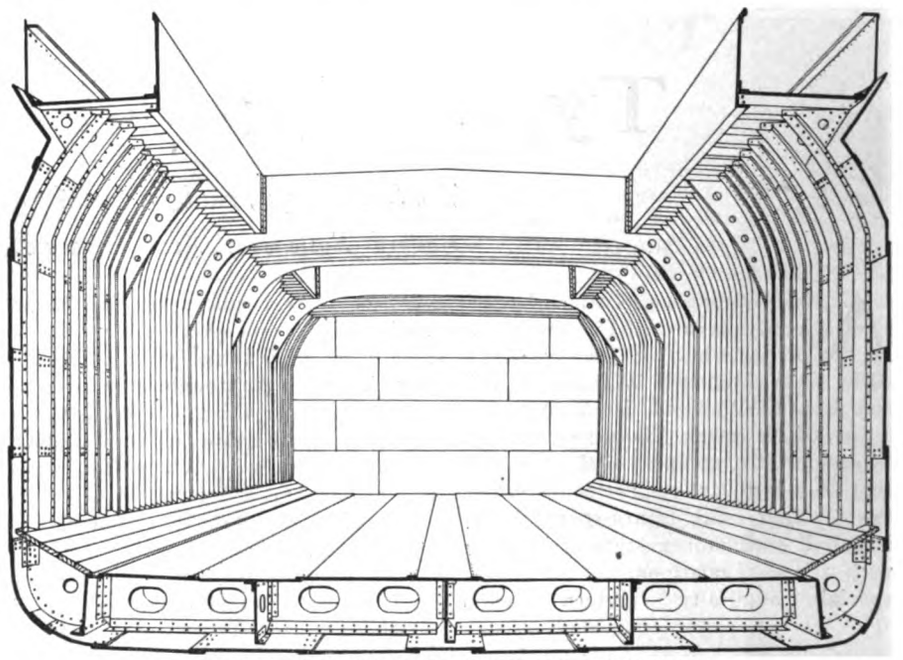
INBOARD PROFILE AND DECK PLAN OF BRITISH COLLIER SHEAF ARROW

in Fig. 2. As described by its inventor, Maxwell Ballard, before a recent meeting of the North East Coast Institution of Engineers and Shipbuilders, the arch system is an innovation in the form of the upper structure, and it consists of strengthened arch girder frames at regular intervals reinforcing the intermediate usual framing. Below the position of the normal molded depth there is no alteration in structure from the ordinary. In lieu of the usual deck at this position with a bridge or shelter deck erection thereon, the structure consists of a transverse arch the upper and lower abutments of which form the termination of the horizontal and vertical spans of flat structure of the deck and sides respectively. This gives a very rigid form of construction to resist the stresses imposed on the vessel. By the frame head knees being arranged outside the framing and carrying the plating back, the deck area is maintained and the capacity of stowage improved. The arch deck height practically corresponds to the bridge or shoulder deck height, and owing to this increased height of weather deck the reverse shear which is moderate in amount does not bring the deck down to the highest point of the ordinary shear line on the forecastle front. At the extremities of the vessel forecastle and poop erections are constructed.

Strength of the Vessel

As regards strength the shearing stress over the cross section of the vessel is a maximum in the way of the neutral axis in the vicinity of the greatest shearing forces at the middle of the fore and after bodies. The reduction in the arch type is about 20.8 per cent. As regards reserve buoyancy the arch deck vessel is superior to the usual type of vessel and the increase in and better distribution of the reserve buoyancy are naturally beneficial to the stability of the design. Under sea-going conditions it appears that there is distinctly less pitching than in vessels of the ordinary design, especially when the vessel is laden with a more or less homogenous cargo such as coal. The rolling motion is most easy and for the timber trade as well as for coal transport this type of vessel appears to be most suitable.

Comparing the arch type of construction with the ordinary vessel, owing to the economy in the distribution of the material in the arch type, whereby a large saving is effected, a smaller vessel is required to fulfil the same requirements as to dead weight, and this involves a large reduction in cost of construction and capital outlay for the ship owner. The saving is effected not by the reduction of scantlings, which are up to full rule requirements, but by the economical re-distribution of material whereby the whole elements of design are so affected as to permit of the reduction in the dimensions. Moreover, there is a reduction in cost of propulsion and maintenance both due to reduction in dimensions, the displacement being considerably less. It is claimed that the coal consumption works out some 5 per cent less for the same dead weight under power. Not only so, but a saving in weight is accompanied by an increase in the hold capacity which is a very considerable advantage especially in the coal trade. About 2 to 2½ cu. ft. per ton increase is gained in underdeck capacity. Enough experience has been gained in this type of construction, even though recently introduced, as to warrant the belief that both as regards economy in production and service, a most remarkable result has been obtained.



BALLARD SYSTEM OF ARCH CONSTRUCTION

Wm. Simmons & Co., Ltd., Renfrew, launched last month, complete with all machinery on board and with steam up ready for trials, a 700-ton hopper steamer, being the fifth of a fleet of eight dredging vessels they have on hand for the naval port, Emperor Peter the Great, now under construction at Reval by the imperial Russian government for warship purposes. The vessel is propelled by compound surface condensing marine engines, supplied with steam from a mild steel horizontal multitubular boiler constructed for a working pressure of 120 lbs. per square inch. Powerful steam gear is provided for rapidly raising and closing hopper doors.

During September, 101 vessels were built, of 30,864 gross tons, of which five were steel, of 17,033 gross tons, and 65 wooden, of 3,967 gross tons. The largest vessels in the lot were the Panaman, of the American-Hawaiian Steamship Co.'s fleet, of 6,649 tons; the Santa Catalina, of the Atlantic & Pacific Steamship Co.'s fleet, of 6,309 tons; the Brilliant, of the Standard Oil Co.'s fleet, of 2,486 tons, and the yacht Cyprus, built for D. C. Jackling, of 1,037 tons.

The steamer Keystorm, belonging to the fleet of the Keystone Transportation Co., which was wrecked near Kingston, Ont., last year, is to be raised by the underwriters who have arranged with A. J. Lee, Westmount, Que., to undertake the work. Wreckers in general will be interested in this performance, as the job is a very difficult one, the steamer lying on her side in 102 ft. of water. Compressed air is to be used to raise the vessel, and it is expected that as soon as she is buoyant she can be moved in about three lengths into comparatively shallow water.

Dock Commissioner R. A. C. Smith, of New York, has had plans prepared for a new dry dock capable of docking the largest vessels in the world, and to be patterned after the immense Gladstone dock in Liverpool.

Northern Pacific Ore Dock

The new ore shipping dock of the Northern Pacific railway, which is situated on the south side of Superior Bay, opposite Superior Entry, Wis., was completed in August, 1913, though work was only begun on the structure in November, 1912. The steamer E. N. Saunders loaded the first ore at this dock on Aug. 24, taking a cargo of 6,700 tons of Crow Wing ore from the Cuyuna Mille Lacs mine, near Ironton, on the Cuyuna range.

The dock is of steel and concrete construction. The length of the dock proper is 684 ft., having a steel approach of 300 ft. and a timber approach of 4,200 ft. It contains 102 pockets having a capacity of 35,700 tons. The amount of steel used in the dock proper was 3,440 tons and in the approach 740 tons. The concrete used in the superstructure amounted to 13,500 cu. yds., and in the bins, 3,400 cu. yds. There is no timber in the dock proper except walks and pocket flooring. The pocket floors have a slope of 47½ degrees. The height of the dock is 80 ft. from mean water level to base of rail. Its width on top, including machinery platforms, is 70 ft. 8 in.; the extreme width across the pockets is 57 ft. 2 in. The bottoms of the pockets are 43 ft. above the lake level and the pockets themselves are, therefore, 37 ft. in height. The superstructure is carried on a series of concrete columns. These columns are 2 ft. 9 in. by 8 ft. in cross section and 34 ft. 10 in. inheight. They rest on concrete pedestals which are 8 ft. 2 in. high. The only reinforcing in the columns consists of four ⅞-in. vertical rods, 34 ft. 10 in. in length, embedded 4 in. from each end surface of the column. The concrete columns are in reality piers. They are tied together longitudinally by two sets of reinforced concrete beams, each 2 ft. deep and 1½ in. thick. The upper row of beams connects the tops of the columns and the lower row is located at a point 16 ft. 5 in. above the top of the pedestals. The bins have circular fronts similar to Great Northern dock No. 4, and the dock is equipped with electric operated hoists and Dickerson pocket doors. The hoists are operated in groups from a line shaft, ten drums being connected to each motor; 25 H. P. 440-volt Crocker-Wheeler motors running 720 R. P. M. on three-phase current are employed. The hoists were manufactured by the Whiting Foundry Equipment Co., Harvey, Ill. The ore spouts are of steel, tapered, 5 ft. 10 in. wide at the upper end and 4 ft. 6 in. at the lower end with a constant depth of 2 ft. They are each 34½ ft. in length and in their lowest position swing 8½ ft. above the water.

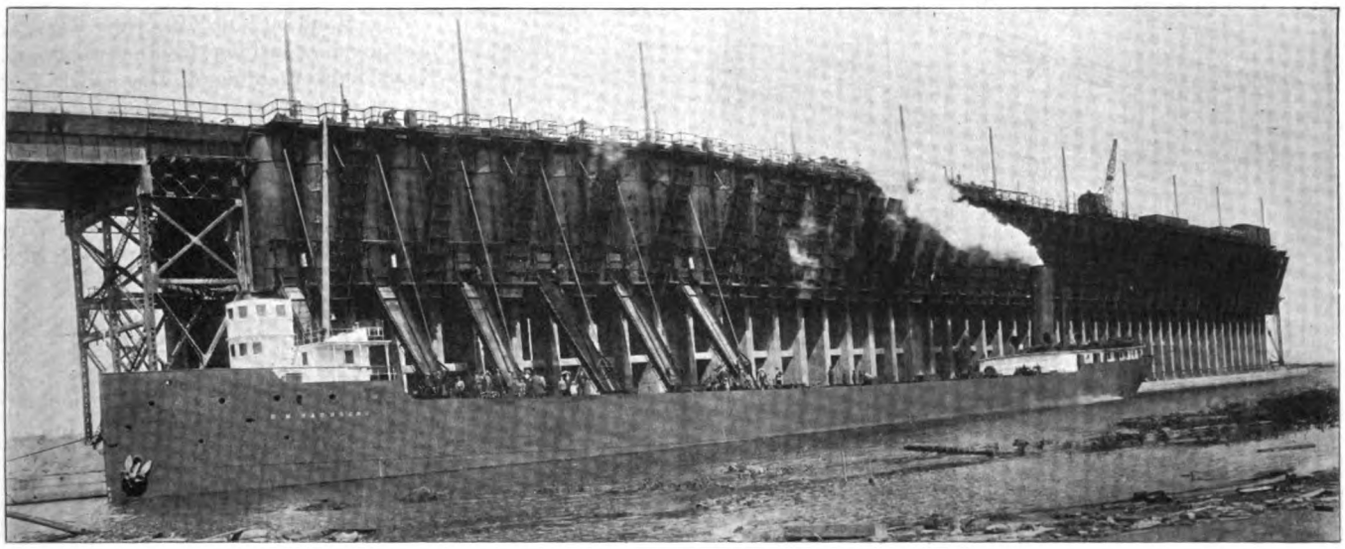
The dock was erected under the supervision of J. W. Bell, assistant engineer of the Northern Pacific railway. The steel and trestle approaches were designed by H. E. Stevens, bridge engineer, and the dock proper by Max Toltz, of the Toltz Engineering Co., St. Paul, Minn. The steel work was fabricated by the American Bridge Co., and erected by the Pittsburgh Construction Co. Siems & Carey, of St. Paul, had the contract for the substructure. The concrete work in the ore pockets was handled by E. S. Johnson & Co., St. Paul.

As stated, the dock proper contains only 102 pockets, but it is so designed that it may be extended to 300 pockets and so placed that two additional docks of 300 pockets each may be built parallel to it. The main line of the Northern Pacific railroad passes through the axis of the Cuyuna range and the dock was erected in order that the railroad might take care of its share of the output of this rapidly growing ore property.

Bids were opened by Lieut. Col. Riche, United States government engineer, for the construction of a 28,200-ft. dock at Texas City, as follows: William Moore, Texas City, $294,095.87; Charles Clarke Co., Galveston, Texas, $315,719.99; R. A. Perry, San Francisco, Cal., $311,788.65; Bowers Southern Dredging Co., Galveston, Texas, $300,010.86; Isaac Heffron, Galveston, $311,832.86; Edward Gillen Dock & Dredge Co., Ashtabula, O., $620,069.73; P. B. Miller, Houston, Texas, $356,204.25; Joseph Stewart Co., Galveston, Texas, $465,041.72.

Kantkink flexible metallic hose, made by the Goodyear Tire & Rubber Co., Akron, O., has many points of difference from the ordinary metallic hose. Inside is a regular hose tube, which carries the pressure and prevents heat, although the metallic surface itself is capable of withstanding pressure even if the inner tube were not there. The outside is an interlocking metallic casing, completely covering the tube and made without sharp or rough edges, while it is so flexible that the hose may be tied into knots without injuring the outer casing. Tests have shown that a pressure equal to 1,000 pounds per square inch will not burst the hose.

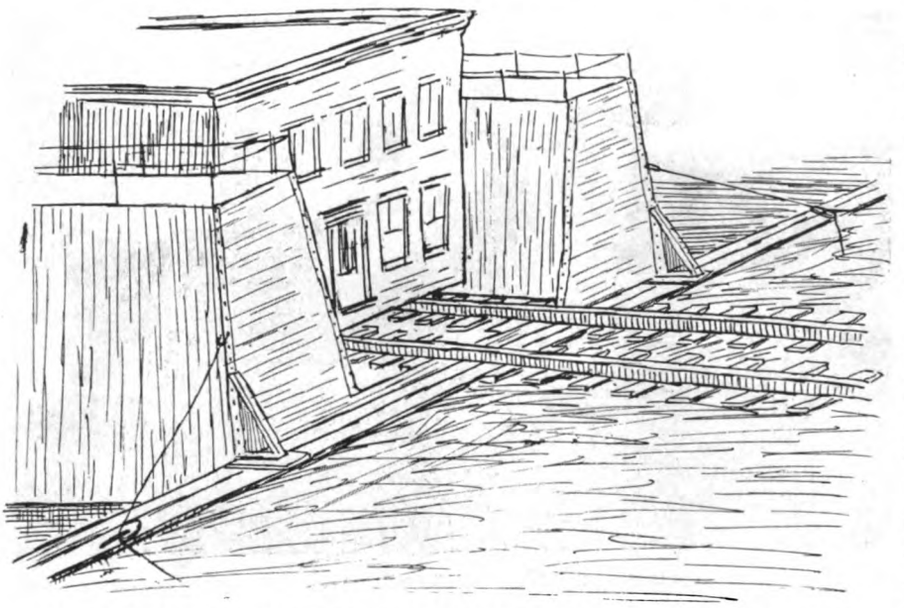
The entire capital stock of the Putnam Machine Co., Fitchburg, Mass., has just been purchased by Manning, Maxwell & Moore, New York. The Putnam Machine Co. is the pioneer machine tool manufacturer in the country, the company having been started in a small way in 1836.



NORTHERN PACIFIC ORE DOCK AT SUPERIOR, AUG. 24, 1913

Transferring a Brick Building by Water

In the October MARINE REVIEW mention was made of the transfer of a brick building from the plant of the Manitowoc Boiler Works to the yard of the Manitowoc Ship Building & Dry Dock Co., Manitowoc, Wis., in one of the sections of a floating dry dock. The problem was an interesting one because obviously in transferring the structure from the wharf to the floating dock means would have to be resorted to to overcome the submergence of the dock, and thus any strain upon the building itself: How this was accomplished is told in the following from the ship building company:



SKETCH SHOWING HOW THE BRICK BUILDING WAS PLACED ABOARD THE FLOATING DOCK

"Timbers were placed under the brick building and it was moved from its foundation to near the edge of the dock in the usual way. A single section of the new floating dry dock which was to be used in transporting the building was then disconnected and towed from the yard to the Boiler Works dock, a distance of one-half a mile. The problem was to transfer the brick building, weighing approximately 170 tons, from the solid wharf to the comparatively uncertain and yielding support of the floating dock section without straining the structure and thereby seriously damaging the building. It will be evident that at some period of the transfer the brick building would be partly supported on the dock and partly on the floating pontoon, and arrangements had to be made so that the floating dock would remain at a constant draft during the transfer. This was effected by making two heavy plate and angle brackets which could be bolted to the end of the floating section, utilizing the bolt holes ordinarily used in connecting the sections. These brackets were five feet vertically and three feet horizontally, and when bolted in position overhung the edge of the wharf. The level of the dock floor was then lowered by the admission of water ballast, the brackets having been adjusted to rest on the edge of the wharf, the pressure being judged by the crushing of soft pine pieces placed under them. The amount of water ballast was calculated as sufficient on being pumped out to raise the brackets from the wharf after the weight of the building was fully taken on the dock. As the weight of the building was gradually transferred from wharf to pontoon the water ballast was pumped out, care being taken to keep a moderate pressure under the brackets all the time. When the building was fully carried on the floating dock the balance of the water was pumped out, the brackets freeing themselves from the wharf and the section was ready for towing to the new site for the building. In unloading the same plan was adopted and the building was landed on its new foundation without any evident sign of stress."

The Manitowoc Ship Building & Dry Dock Co., is now making an addition to the brick building which when completed will contain the combined forces of the boiler shop and shipyard. The company is consolidating both plants in the one yard.

Items of General Interest

There are at present building on the Clyde five vessels to be driven by Diesel engines.

The Reading railroad has given contract to the Harland & Hollingsworth Corporation for a new ferry boat for service at Philadelphia.

Gamboa dyke was dynamited on Oct. 10. Earthquake disturbances are occurring in the Republic of Panama, but are of minor force.

The bid of William Moore, Texas City, was the lowest for constructing the Texas City dyke. His bid amounted to $294,096.

Swayne & Hoyt, San Francisco, Cal., announce that they have inaugurated a new line of steamers between San Francisco and the Orient with sailings every three weeks.

The Standard Oil Co., New Jersey, has given contract to the Newport News Ship Building & Dry Dock Co. for an oil tanker 460 ft. long by 60 ft. beam and 29 ft. deep.

The Alaska Pacific Steamship Co., through its president, H. F. Alexander, has purchased the steamers Admiral Schley and Admiral Dewey from the United Fruit Co.

Andrew Scott, of London, secretary of Lloyds Register of Shipping, and James French, formerly surveyor for the United States and now principal surveyor at Glasgow, are making a tour of American shipyards.

In order to provide suitably for the tourist traffic during the coming season on the canal zone, the Panama railroad has decided to add a trip through Gatun lake as one of the regular features of its sight-seeing service. Gatun lake covers 164 square miles.

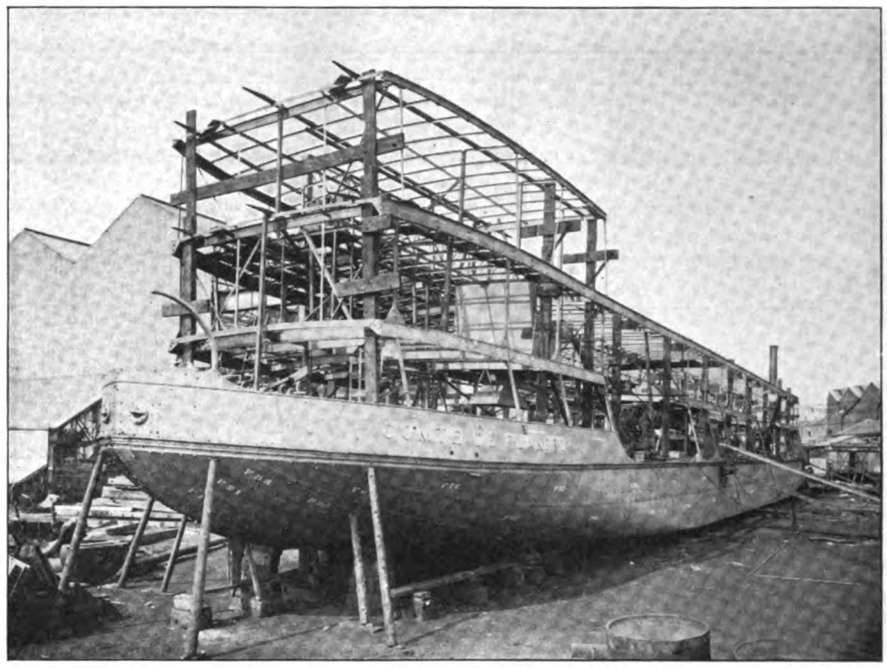
We do not realize the wonders of electrical transmission until it is brought home to us by some striking fact. At one minute after 2 o'clock on the afternoon of Oct. 10. President Wilson touched an electric button to blow up the Gamboa dyke. At two minutes after 2 a message was received in New York that the dynamite explosions had taken place.

The wonders of wireless are exemplified in little things as well as in big ones. A fireman on the Canadian Pacific liner Monmouth was stricken in mid-ocean with severe internal hemorrhage. As the Monmouth carries no surgeon, the captain treated the case through wireless instruction received daily from the doctor on board the Hesperian. The treatment was quite successful.

Shallow Draught Steamer

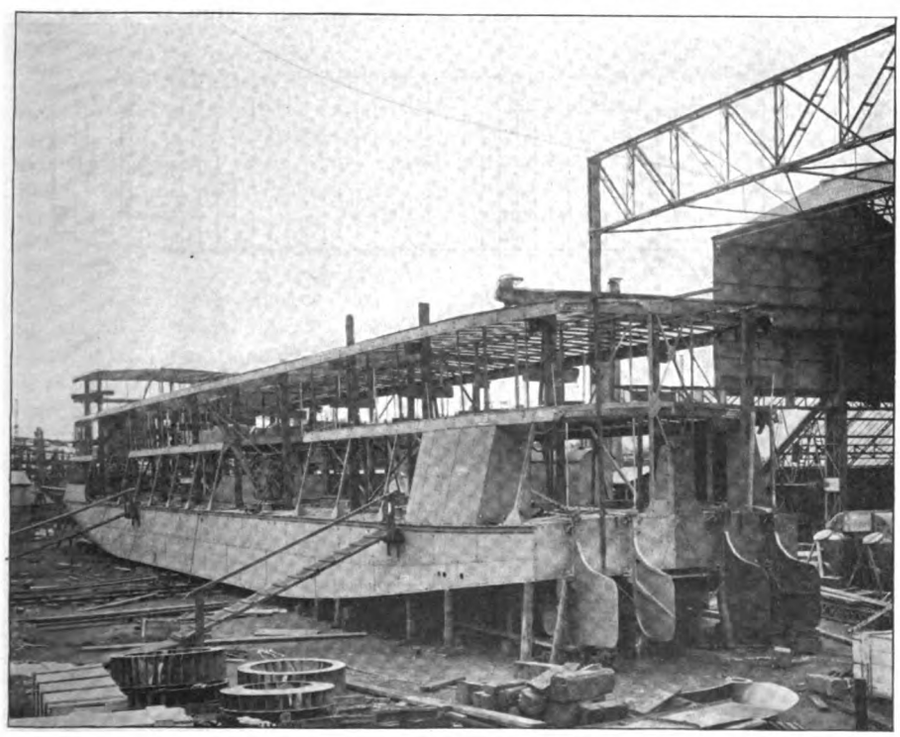
Type of Vessel Built for the Congo With Screw Operating in a Tunnel

AN interesting type of shallow draft steamer, built by Yarrow & Co., Ltd., of Glasgow, Scotland, to the order of Lever Bros., Ltd., of Port Sunlight soap fame, is illustrated in the accompanying engravings. This vessel, named the Comte de Flandre as a compliment to the second son of the king of the Belgians, is for service on the Congo in bringing oil down from the upper reaches of the river. The vessel is propelled by a single screw working in a tunnel fitted with Yarrow's latest type of patented hinged flap. In this case the hinge is arranged to work automatically, it being balanced by balance weights as shown on the drawing. It has been usual hitherto for the flap to be lowered and raised according to the conditions of draft, by means of screw gear or automatically, but in this case, as the flap is balanced, it will of its own accord find its correct position under various conditions of steaming without absorbing any power. The hull is divided into ten compartments including the engine and boiler rooms, which are placed amidships. Forward of these are three cargo holds having a total capacity of 10,080 cu. ft. and also the chain locker, while aft there are holds having a capacity of 11,950 cu. ft. The deadweight cargo capacity is 250 tons on a draft of only 4 ft. 6 in., and the estimated speed is 10 knots.



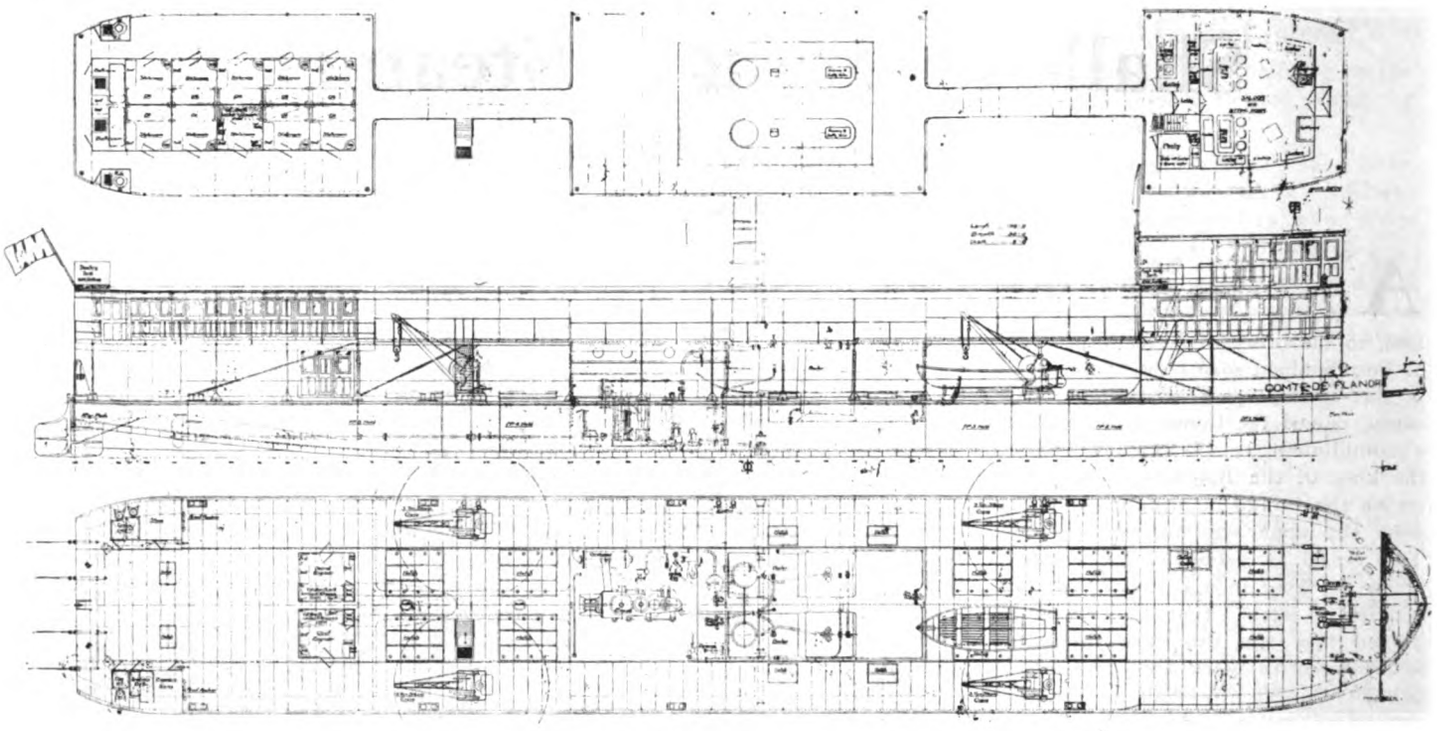
THE COMTE DE FLANDRE. LOOKING AFT

Accommodation is provided for 10 first-class passengers in separate single-berth cabins on the spar deck aft. These cabins are fitted with mosquito-proof doors and windows, and protection from the sun is afforded by side awnings and a considerable air space between the cabin tops and the awning deck. Aft of the cabins are two bath rooms for the use of the passengers. The dining saloon is forward and adjoining it are the pantry and galley. Entrance to the saloon is obtained from the main and awning decks through porches with double doors, the purpose of these being to prevent, as far as possible the entrance of mosquitoes into the saloon. Above the dining saloon on the awning deck are cabins for the captain and manager, and immediately forward of these are the steering engine and steersman's shelter. The deck fittings include a steam winch supplied by Dunlop, Bell & Co., of Liverpool, for working the anchor and warping the ship round bends in the river. Four 3-ton steam cranes by the same makers are also fitted to enable the cargo to be handled expeditiously, each crane serving two holds.



THE COMTE DE FLANDRE ON THE WAYS

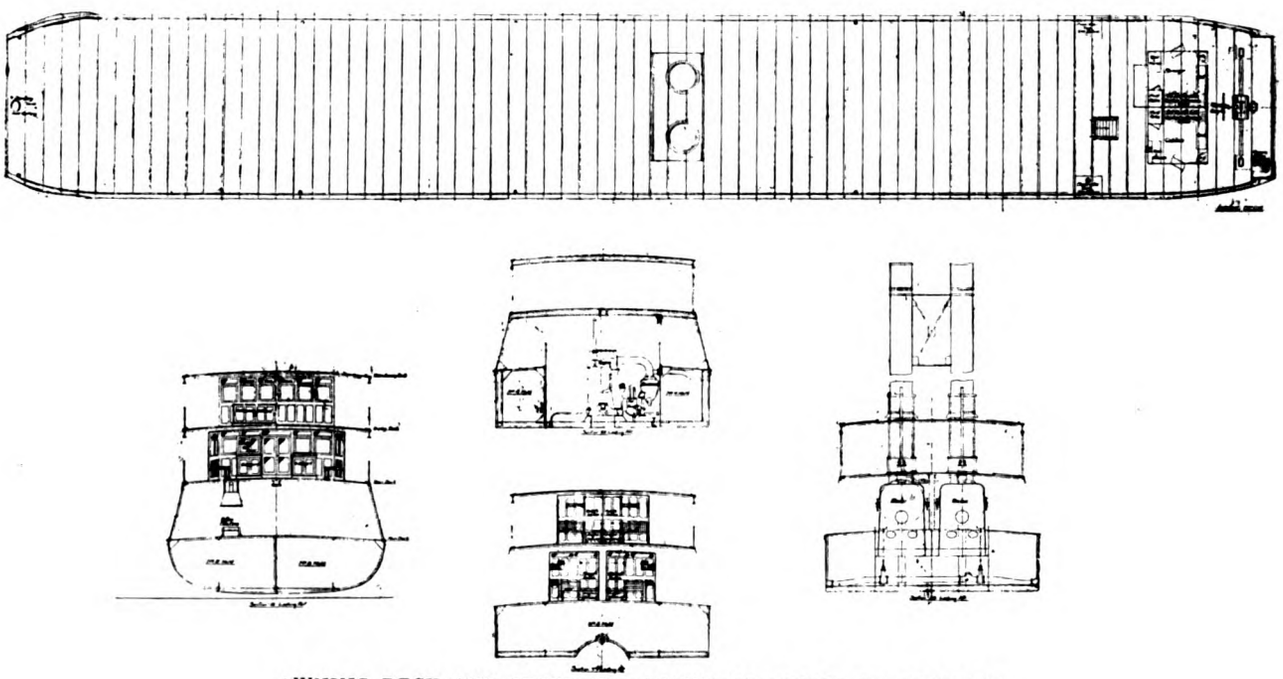
The vessel, as will be seen in the engravings, has a specially-designed spoon bow to avoid damage from running aground. The propelling machinery consists of a set of triple-expansion engines constructed by



GENERAL ARRANGEMENT OF THE COMTE DE FLANDRE

Messrs. Yarrow. The high-pressure and intermediate cylinders are each fitted with piston valves, and the low-pressure cylinder with a flat double-ported slide valve. A steam reversing engine is fitted to facilitate the handling of the engines. The air pump is of the Edwards type. A single condenser of the Weir "Uniflux" type is fitted in the wing of the vessel, and a circulating pump constructed by Messrs. Paul, of Dumbarton, is supplied. These is also installed in the engine room a combined fire, bilge and sanitary pumping appliances. There is also a complete installation of electric light on board. The whole of the steel work and cabin work was completely erected by Messrs. Turnbull. In the stokeholds are fitted two locomotive type boilers constructed by the North British Locomotive Co., of Glasgow. These boilers are fitted with large tubes and specially large fire boxes so that wood fuel may be burned. In the stokehold there is also one Weir's feed pump as well as auxiliary pumped and as much of the steel work as possible permanently riveted in the builders' yard. The vessel was then taken to pieces and shipped to the Congo, where it will be erected and finished by the Huilerie du Congo Belge. The designs and the work have been under the supervision of Messrs. Esplen & Sons, of Liverpool.

John Pridgeon Jr. has been elected president of the White Star Line to succeed the late Byron W. Parker.



AWNING DECK AND SECTIONAL VIEWS OF COMTE DE FLANDRE

American Ship Building Co.

Some Important Changes in Its Directorate —Financial Condition of the Company

THE annual meeting of the American Ship Building Co., of Cleveland, was held in Jersey City, N. J., early in October and certain changes were made in the personnel of the board of directors. Five directors retired and five new stockholders were elected in their places. The retiring directors are R. B. Wallace, present general manager of the company; H. M. Hanna, P. A. McMillan, A. M. Joys and F. T. Gates. The new directors chosen were Starr J. Murphy, Alfred L. Baker, Frederick A. Brown, H. A. Christy and A. A. Sprague II. The Rockefeller interest on the board remains the same, Mr. Murphy succeeding Mr. Gates. The directors re-elected were L. M. Bowers, W. L. Brown, James H. Hoyt, Robert L. Ireland, Samuel Mather, H. H. Porter, Edward Smith, G. A. Tomlinson, James C. Wallace and R. C. Wetmore.

W. L. Brown, chairman of the board, declined to stand for re-election and this office was left vacant. The other officers were re-elected as follows: James C. Wallace, president; R. C. Wetmore, vice president and treasurer; O. J. Fish, secretary and assistant treasurer and M. M. Chew, assistant secretary. The regular quarterly dividend of 1¾ per cent payable Oct. 15 was declared on the preferred stock, though no action was taken as to dividends on the common stock.

In his annual report to the stockholders for the fiscal year ending June 30 last, James C. Wallace, president of the company, says that marine affairs on the Great Lakes for the fiscal year were poor, low rates prevailing, and in consequence the company did not enjoy a very favorable year, but probably equal to the average of all business directly connected with lake operations. The capital stock of the company remains unchanged, there being issued $7,900,000 on preferred and $7,600,000 on common.

Properties of Company

The properties owned and controlled by the company include a construction yard with boiler and machine shops and three dry docks at Cleveland; a construction yard with boiler and machine shop and two dry docks at Lorain; machine and boiler shop and three dry docks at Detroit; construction yard and machine shop at Wyandotte; construction yard, two dry docks and machine shop at Superior; two construction yards, two machine shops and three dry docks at Chicago; a machine shop and two dry docks at Milwaukee; a construction yard, machine shop and three dry docks at Buffalo; a construction yard, machine and boiler shops and one dry dock at Port Arthur.

During the year the company built and completed 14 vessels of 50,800 tons carrying capacity on 19 feet draught, and had under construction at the beginning of the fiscal year 12 vessels.

Concerning the condition of the properties and the outlook for the future, Mr. Wallace reports as follows:

"In 1889, when the various plants were amalgamated, all were more or less equipped for building new tonnage, and fully so for repair work. The new tonnage constructed at that time was of much smaller size than that being built today, and during the period, the carrying capacity has increased from 5,000 to 12,000 tons, making it necessary to change and enlarge all of the plants at which new construction has been built, and at the same time to concentrate the construction plants, and engine and boiler shops as close as possible to supply of materials.

Dry Docks Enlarged

"In addition to enlarging the construction plants and centralizing them, it has been necessary to enlarge practically all of the dry docks that the company started with originally, and build new ones at different lower lake ports, as with the amalgamation of the various vessels, fleet owners have largely been carrying their own insurance, and prefer to have repairs made at the lower rather than at the upper lake ports, and in nearly all cases, where it is possible to do so, unless the damage is very great, vessels are brought to the lower lake ports for repairs.

"During the fiscal year, the company has built and completed 14 vessels and has now under construction 12 vessels. The prospects for the coming year are not good for new construction, as it has been demonstrated that with the increased depth of water and the rapidity that has been attained in loading and unloading, through the installation of new and modern plants at the loading and unloading ports, the present tonnage on the lakes is ample, although it is believed a large amount of reconstruction work will have to be done during the coming winter on the smaller and older vessels, to enable them to take full advantage of the changes in methods of loading and unloading cargoes."

Financial Statement

Following is the financial statement, showing the combined assets and liabilities of the company as of June 30 last:

ASSETS.

Cost of real estate, buildings, machinery, etc., including cost of stocks in subsidiaries.....		$18,965,312.23
Sundry bonds and stocks.....		2,377,214.41
Materials and supplies.....		611,174.56
Notes and accts. receivable:—		
Notes receivable...	$949,047.63	
Accts. receivable..	958,695.83	
Advances to subs.	418,141.39	
Acr'd uncom. con.	838,280.53	3,164,165.38
Cash		957,282.43
		$26,075,149.01

LIABILITIES.

Cap. stock, prfd..	$7,900,000.00	
Cap. stock, com..	7,600,000.00	15,500,000.00
Notes and accts. payable:—		
Notes payable....	$2,800,000.00	
Buffalo mortgage..	300,000.00	
Accts. & bills aud.	126,064.86	3,226,064.86
Reserves:—		
For maintenance..	$300,000.00	
For insurance.....	168,993.56	
For dividends.....	138,250.00	
For taxes.....	180,474.04	787,717.60
Surplus, including working cap.:		
Bal. June 30, 1912	$6,507,892.34	
Surplus for year end. June 30, 1913:—		
Earn. for year before deduct. maintenance and dep.	849,873.89	
Less: maintenance.	243,399.68	
	$606,474.21	
Less: prfd. div...	553,000.00	
	53,474.21	6,561,366.55
		$26,075,149.01

Note:—In addition to the foregoing there exists a contingent liability from the guarantee of first mortgage bonds on steamships built by the company, aggregating $345,000.00 and carrying interest.

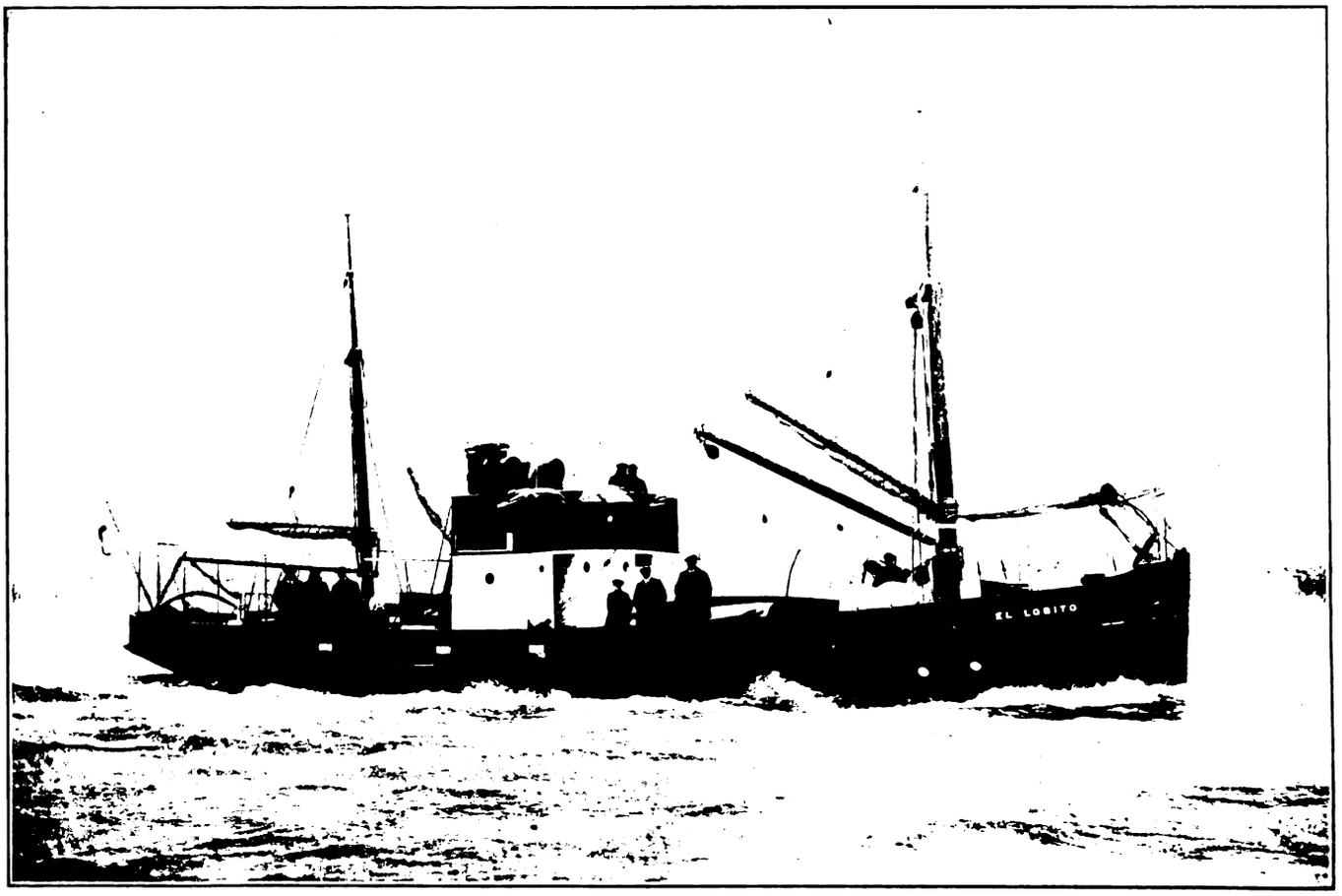
The Newport News Ship Building & Dry Dock Co. launched the collier Louis K. Thurlow, for Crowell & Thurlow, of Boston, on Oct. 4. The collier, which is built on the Isherwood system, is 318 ft. long, 46 ft. beam and 25 ft. deep.

President Wilson has sent to the senate the nomination of Col. Dan C. Kingman, corps of engineers, as chief of engineers with rank of brigadier general.

Motor Cargo Vessel

A Type of Vessel Built by Thornycroft & Co. for Peruvian Coastal Service

THERE has recently been built by John I. Thornycroft & Co., Ltd., Southampton, Eng., the twin-screw motor cargo vessel El Lobito, illustrated herewith. This vessel has a length between perpendiculars of 75 ft., beam 16 ft., depth, molded, 8 ft., and a draught, extreme, of 6 ft. 10 in. The El Lobito has been built to the order of the Lobitos Oil Fields, Ltd., and is intended for moderate distance voyages along the coast of Peru, carrying a maximum of 50 tons of cargo, consisting of cast iron pipe line. The hull has been built on the composite system, having teak planking on galvanized steel framing, and has been built (hull and machinery) under Lloyds supervision throughout. The decks are of Kauri pine.



EL LOBITO, TWIN-SCREW MOTOR VESSEL

El Lobito, although a cargo boat, presents quite a fine appearance, having a graceful sheer and bold lines. She is rigged as a ketch and carries an ample sail area. Accommodation has been provided aft for officers, consisting in large saloon with sofa seats, which can be turned into berths, and two folding cots have been provided so that six people can be berthed. The motors are located in separate watertight compartments between the cargo hold and the after accommodation. At the after end of the motor space fuel tanks of six tons capacity of paraffine are provided. The top tank is used to give gravity feed to the motors, fuel being pumped up from the other tanks by a semi-rotary pump. Forward of the motor space is situated the cargo hold, 22 ft. 6 in. long, to accommodate long lengths of pipe, and the total capacity of the hold is 50 tons. A large hatch has been arranged to this space to facilitate handling the cargo, and it measures 18 ft. 6 in by 6 ft. 6 in. For working the cargo an electric and hand winch has been fitted on the upper deck forward, capable of lifting up two tons. Current is obtained from an electric dynamo fitted in the motor room. A strong pitch pine derrick is fitted on the foremast for runing the cargo. Two side houses containing lavatory on the port side and lamp room on the starboard, together with the galley, are fitted under the bridge. The galley is fitted up with an oil cooking range and all necessary dressers, shelves, etc. Electric lighting is fitted throughout, supplied direct from the dynamo in the motor room. To add to the appearance of the vessel and for facilitating the exhaust leads a funnel has been fitted abaft the bridge. This arrangement has been found to be the most satisfactory, as it not only simplifies the exhaust arrangements by putting the silencer in the funnel, but ventilates the motor room, and also keeps

the heat well away from the motor room. The vessel is steered from the bridge by means of Archer's patent hand-steering gear, and is also fitted with hand capstan forward for working ship cables. One 16-ft. lifeboat is also provided and stowed in the hatch forward.

The machinery consists of two sets of Messrs. Thornycroft's S/4 type paraffine engines, having four cylinders, 8½ in. diameter by 12-in. stroke and developing 100 H. P. on the brake at 550 r. p. m.

In point of fact, in this vessel a speed of half a knot over the 8½ knots guaranteed was obtained with the engines running at 470 r. p. m., and consequently a speed was obtained without unduly forcing the machinery. As is well known, paraffine engines give the best economy at about seven-eighths full power, and this is borne out in the case of this vessel, her consumption of fuel being about 18 gallons per hour at about 8⅞ knots. An auxiliary set is provided for driving an electric light engine, and an auxiliary air compressor. This last is only a standby, as there is a compressor on each main engine, and it is only in the unlikely event of air leaking away when the boat is laid up that the auxiliary compressor is required. Reversing is obtained by an epicyclic reversing gear, fitted at the after end of the engine. The El Lobito is capable of making the voyage out to Lobitos, Peru—a distance of 10,135 miles—under her own power. It is noteworthy that the fuel consumption at 8 knots (obtained with one engine only) is only 0.8 or 0.9 of a ton per day, giving a radius of action on 50 tons of over 10,000 miles.

Chinese Cruiser Fei Hung

The practice cruiser Fei Hung, recently completed by the New York Shipbuilding Co., Camden, N. J., for the Chinese government has completed an exhaustive series of speed, gun and torpedo trials. Guaranteed by her builders to maintain a speed of 20 knots per hour, the Fei Hung attained on trial a speed of 22½ knots.

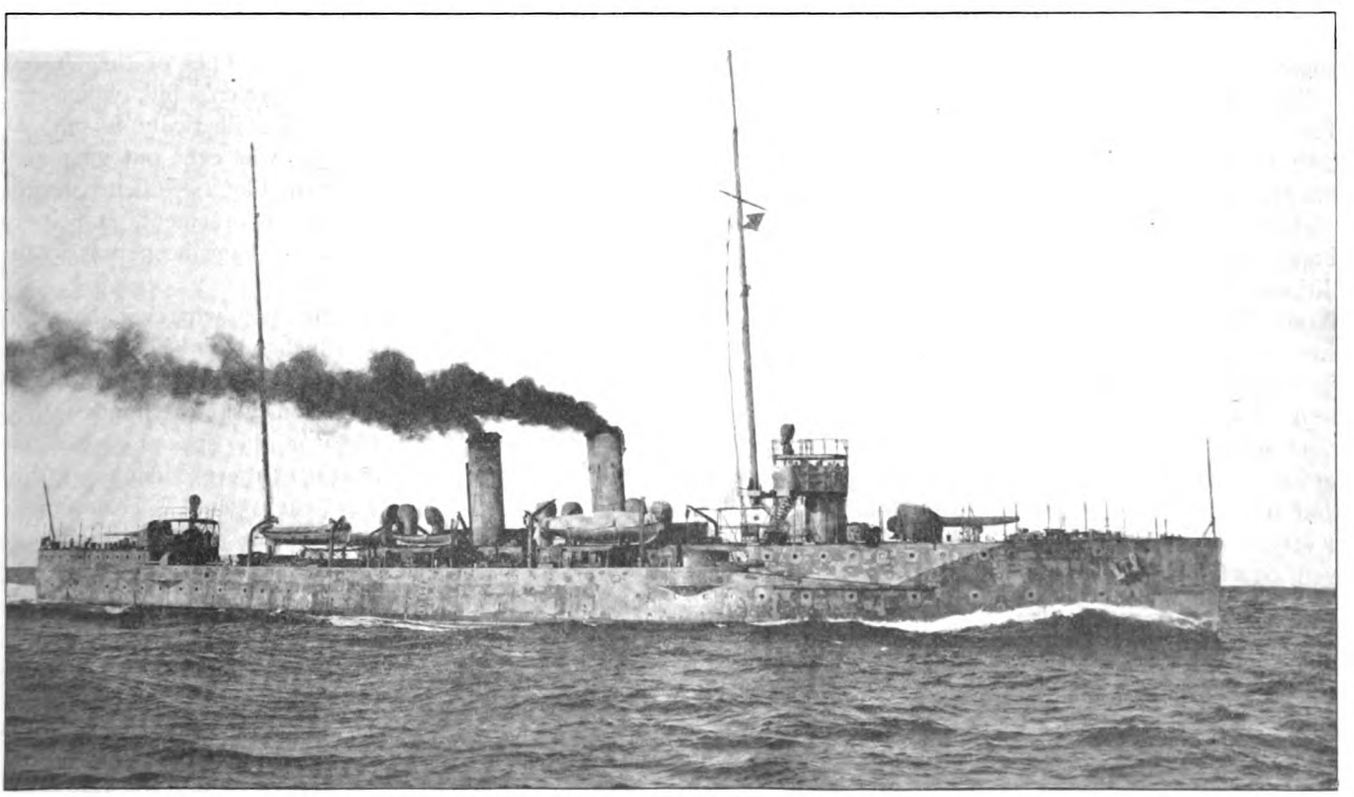
In addition to the full speed trial, a twenty-four hour endurance trial was run to determine the fuel consumption at a speed of 18 knots. The results of this test were as satisfactory as those where speed only was a consideration; the consumption of fuel being remarkably low and considerably below that required by the contract.

Upon completion of the full speed trials, all the guns in the ship's armament were severely tested by being repeatedly fired with full battle charges. One broadside or salvo was fired in which all the large guns on board were discharged simultaneously by means of an electric button on the bridge. The unusual test, as well as all the other gun firing, was most satisfactory and in addition to demonstrating the excellence of the guns gave abundant proof of the strength and ruggedness of the vessel herself.

The gun trials were followed by torpedo tests upon conclusion of which the Fei Hung returned to Camden to be prepared for her long voyage to the East.

The Chinese officers who were present at the trials expressed themselves as greatly pleased with the results obtained and the generally satisfactory performance of the vessel.

The Fei Hung is a protected cruiser of about 2,600 tons displacement. She is 320 ft. long, has two masts and two funnels. The propelling machinery consists of three steam turbines of the Parsons type which are supplied with steam by three Thornycroft water tube boilers, one of which is fitted for burning oil fuel. The vessel is constructed with a double bottom and is further divided into watertight compartments by numerous bulkheads, both transverse and longitudinal. A heavy nickel steel protective deck extends for the whole length, covering engines, boilers, magazines, steering gear, and all other vital parts. The ammunition hoists to the largest guns are also protected by nickel steel trunks; there is a heavy armored conning tower and the larger guns are provided with armor shields. The armament of the Fei Hung consists of two 6-in., four 4-in. and two 3-in. rapid fire guns, six 3-pounders, two 1-pounder automatic guns, and two 18-in. torpedo tubes. There is a very complete electric plant, wireless telegraph outfit, numerous boats, among which are a steam launch and a motor boat.



THE CHINESE CRUISER FEI-HUNG ON HER TRIAL TRIP

THE MARINE REVIEW

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November, 1913

The Case of the Volturno

The burning of the steamship Volturno at sea brings acutely home the great debt which the world owes to wireless. Without this wonderful agency there is little doubt but that every soul on board the Volturno would have been lost. As it was, within a few hours she was surrounded by no less than 11 great liners, standing by in readiness to give assistance the moment that it could possibly be rendered.

This latest sea tragedy focuses attention upon the fact that fire is still the most serious of marine perils. The records for the past seven years show that on an average one steamer is destroyed per day by fire. Naval architects are agreed that as it is absolutely impossible to make a vessel unsinkable under all conditions, it is also impossible to make a vessel absolutely fireproof. The seriousness of fires, however, can be minimized by automatic detection upon the instant that they occur and by the automatic application of fire-fighting apparatus. The quickest way to put out a fire is by declining to give it a chance to grow. Fires as a rule have very small beginnings and if instantly detected can be put out very quickly. Every precaution, of course, should be taken to prevent fire from starting at all, but accidents will happen and the means should be at hand to combat the fire when it does break out. Every ship should be equipped with fire detecting and fire fighting apparatus just as much as with wireless equipment. No more terrible calamity can befall a vessel than to be burning in mid-ocean with a fire beyond control. Such was the case of the Volturno and the predicament of the passengers and crew was greatly added to by the violent storm raging at the time.

This tragedy demonstrated how useless the life boat equipment is upon occasions. The North Atlantic is no place for a small row boat in stormy weather. It is only through a miracle that they live after they are launched, and it is only through the rarest good luck that they can be launched at all. Four of the Volturno's life boats were smashed in launching and the two that got away safely from the ship have never been heard of since. The great vessels circling about the Volturno were unable to reach the stricken ship with their own life boats and had to stand by until the storm quieted.

It cannot be emphasized too much that real safety at sea rests only in the hull of the vessel itself. It is on the hull of the ship that the problem of safety should be concentrated. By longitudinal and athwartship subdivisions the hull can be made reasonably safe from ordinary collision. The chances are that the Titanic would not have sunk had she been longitudinally subdivided. The chances are also that the fire on the Volturno would not have reached the alarming proportions that it did had the danger been automatically conveyed to the pilot house at once and automatic help given until the real fire fighting apparatus of the ship could have been massed on the fire. It would be well for the forthcoming International Conference for Safety at Sea to consider the general subject of fire protection aboard ship.

The Lafollette Seamen's Bill

No legislation that has ever been attempted has so stirred up the passenger steamship lines of the United States as has the LaFollette seamen's bill, which recently passed the senate. This bill really is one of the most absurd measures that was ever put on paper and it is surprising that a man like LaFollette should have been led to give it his endorsement, and it is equally surprising that it should have been practically railroaded through the senate.

This bill makes no distinction whatever between the essential differences which obtain between deep sea navigation and navigation on the inland waterways of the country. It is a mechanical impossibility for the ships constructed for the special trades on inland waterways to conform to the provisions of this bill insofar as life boat equipment is concerned. They are not designed to sustain such a weight on the boat deck. Few people realize that these life boats with their davits weigh anywhere from two to four tons in light condition, and considerably more than that when loaded. The superstructure would have to be entirely rebuilt to sustain such a weight and the vessels would then become top heavy, unseaworthy and worthless for the special trades for which they are intended. If these vessels are com-

pelled to carry life boat equipment for all, they will simply have to cease running, because the only alternative that could be presented would be to cut down the passenger list to conform to life boat equipment and that would not leave enough passengers to pay expenses.

The Titanic disaster with its frightful mortality is responsible for this agitation on life boat equipment. It so happens that more lives could have been saved had the life boat equipment of the Titanic been larger, but the conditions under which the Titanic foundered will probably never be experienced again. The sea was perfectly quiet and the passengers absolutely composed, because they did not think that the Titanic was sinking.

The case of the Volturno approximates the average condition of life saving at sea by means of life boats. Every boat that was lowered was either capsized or wrecked in launching or lost later on.

The issue is without point, however, insofar as it concerns the great steamers plying in the North Atlantic trade, because they have all equipped themselves with sufficient life boat equipment to accommodate every passenger without the necessity of compulsory legislation.

The real point is that legislation should deal with the conditions to be met with in actual practice. It is impossible to make such a measure as the LaFollette bill uniform without doing a frightful injustice to many steamship lines. As a matter of fact, the security of the passengers carried on the Hudson River Day Line would be better safeguarded if these vessels carried no life boats at all. Should anything occur on one of these vessels to create a panic, and should there be a rush of passengers to the boat deck and an attempt made to launch life boats, it is absolutely certain that in the rush and excitement some one would be injured. Were there no life boats aboard no such rush could occur and the vessel could be beached in two minutes. Moreover, as in certain stretches of the route these vessels feel the bottom it would give them added serviceability by less displacement by dispensing with the life saving equipment altogether.

The passenger vessels of the Great Lakes are specially constructed for the trade in which they are engaged and are wonderful specimens of naval architecture in that regard. The routes are short and the vessels are constantly in sight of land, and should anything occur on them they could be beached in far less time than it would be possible to launch one-tenth of the life saving equipment under the LaFollette bill.

Why this bill should put such an emphasis upon life boat equipment and fail to make any mention whatever of other life saving appliances, is a mystery. Fire is a frequent source of danger on board ship, but this bill makes no mention of fire fighting equipment. 'Tis true that the great majority of fires occur in port, but it is one of the forms of danger which calls for eternal vigilance, and yet the LaFollette bill is silent on this subject.

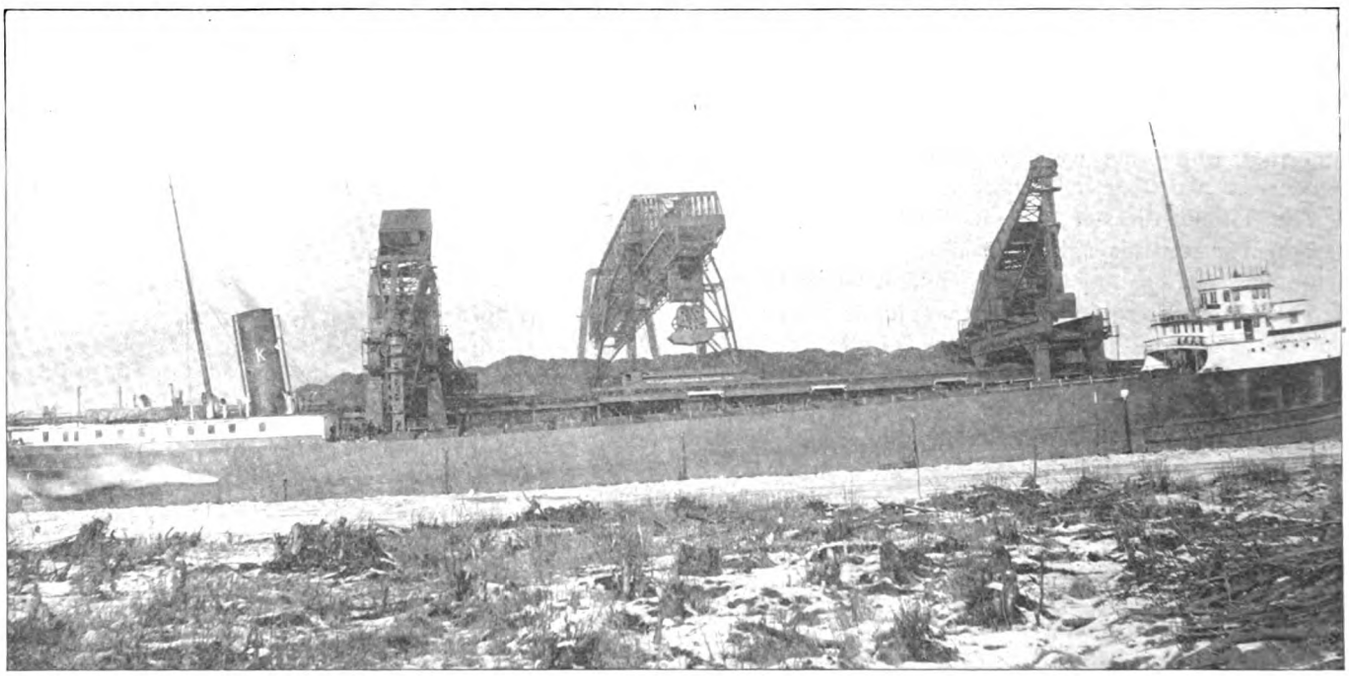
Take a concrete example under this bill. The steamer Seeandbee, of the Cleveland & Buffalo Transit Co.'s fleet would have to carry 117 life boats and 234 able seamen to man them, because the bill provides that two able seamen be carried for each life boat. The bill then designates what the term able seamen means. To be an able seaman one must have served three years on a deep sea vessel or a vessel plying the Great Lakes. Men that have served on Chesapeake Bay, Delaware Bay, Long Island Sound and similar waters, would not be regarded as able seamen and would not be eligible. The able seamen on the Great Lakes would be only the forward crew, that is to say, the masters, the mates, wheelsmen and watchmen, and it is clear that there would not be enough able seamen to go around.

But confusion becomes more confounded when one views the provisions regarding the over-riding of consular treaties giving foreign seamen the right to desert at American ports. It appears as though congress had already done enough to make foreign nations suspicious of our sincerity without giving them further cause. Under this provision an undesirable alien who would not be admitted to the country as a paying passenger could be landed on these shores as a deserting seaman.

There are many provisions of the bill which may have had some point to them at some time, but which certainly have no point now. The days have gone by when flogging and other forms of corporal punishment were administered on board ship to seamen. The day has also gone by when they were half starved or improperly fed. The average ship owner keeps his crew in good physical condition and finds it profitable to do so. The bill seems to have been built on a mass of misinformation and some of its provisions must have been inspired by design. It is curious how even statesmen can be deceived. Senator Burton was the only one who spoke upon the subject that appeared to have any real knowledge of actual conditions.

As a bit of legislation this bill is really an absurdity and it is not conceivable that it can pass the house. Yet, nevertheless, there is an element of great danger in the situation and steamship men are very much alarmed. The bill will not come up in the house until the regular session of congress and the interim will be devoted by steamship interests in informing the country in general as to the real nature of this bill. It is not possible that if its provisions are thoroughly understood by the house of representatives it can possibly be passed in its present shape.

The congress of the United States should not for one moment consider enacting any legislation whatever affecting navigation until the International Conference on Safety at Sea has been held in London. It would be perfectly foolish to pass any legislative measure whatever in this country until the combined opinions of all nations upon the subject have been obtained. Certainly some very valuable lessons will be learned from this conference and the country should have the benefit of them.



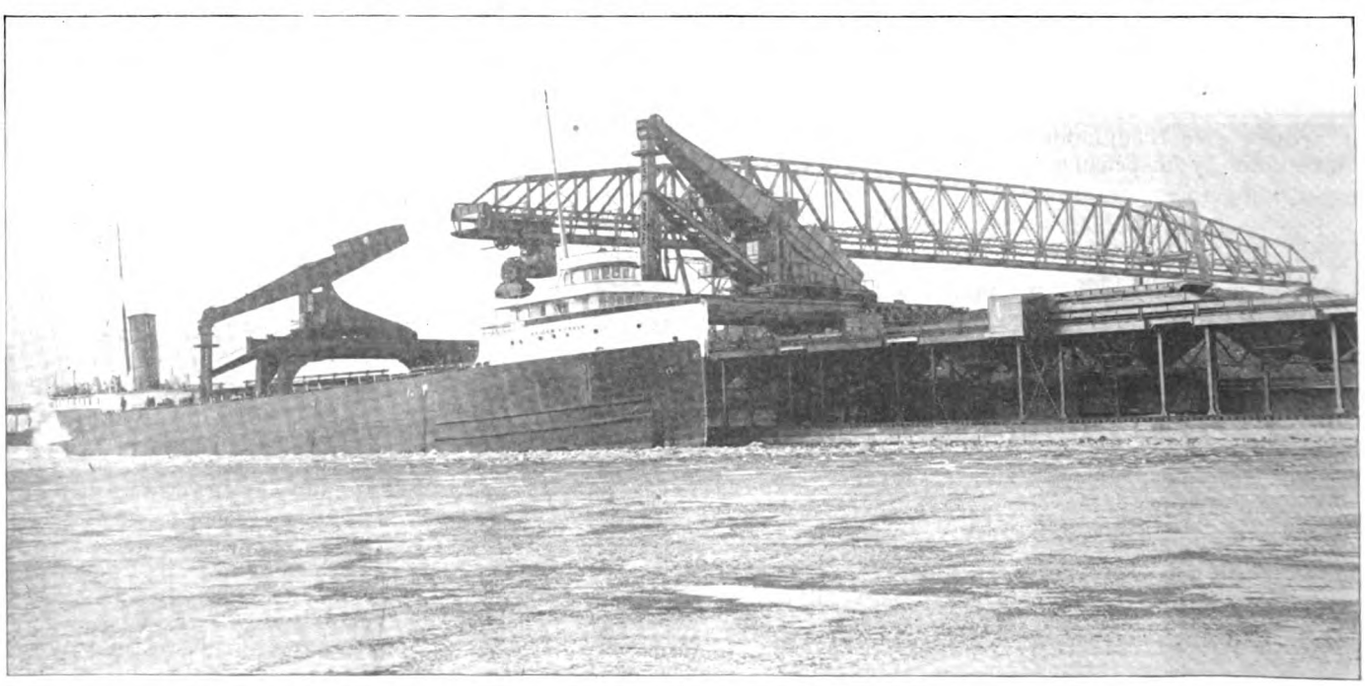
BROADSIDE VIEW OF STEAMER ANDREW S. UPSON UNDER THE HULETT COAL UNLOADING MACHINES

Coal Unloading Machines

The First Application of the Hulett Unloader to the Problem of Handling Coal

THE Hulett machine for unloading ore is quite a familiar sight at the leading Lake Erie ports. The first installation of this type of machine for unloading coal has now been at work for several months on the Canadian Pacific railway docks at Fort William, Ont., and is giving excellent satisfaction. No efforts have as yet been made to speed up the equipment, but the battery of two machines has unloaded a 10,000-ton steamer in 14 hours. To be exact, on Aug. 1 the battery unloaded the steamer W. A. Paine, with a cargo of 9,159 tons of soft coal, in 13½ hours' working time, averaging 339 tons for each of the unloaders. On Sept. 9 the steamer J. G. Butler Jr., with a cargo of 10,499 tons of soft coal, was unloaded in 15½ hours' working time.

The plant on the dock consists of two Hulett electrically operated eight-ton coal unloading machines, one nine-



BULK FREIGHTER ANDREW S. UPSON UNDER THE HULETT COAL UNLOADING MACHINES

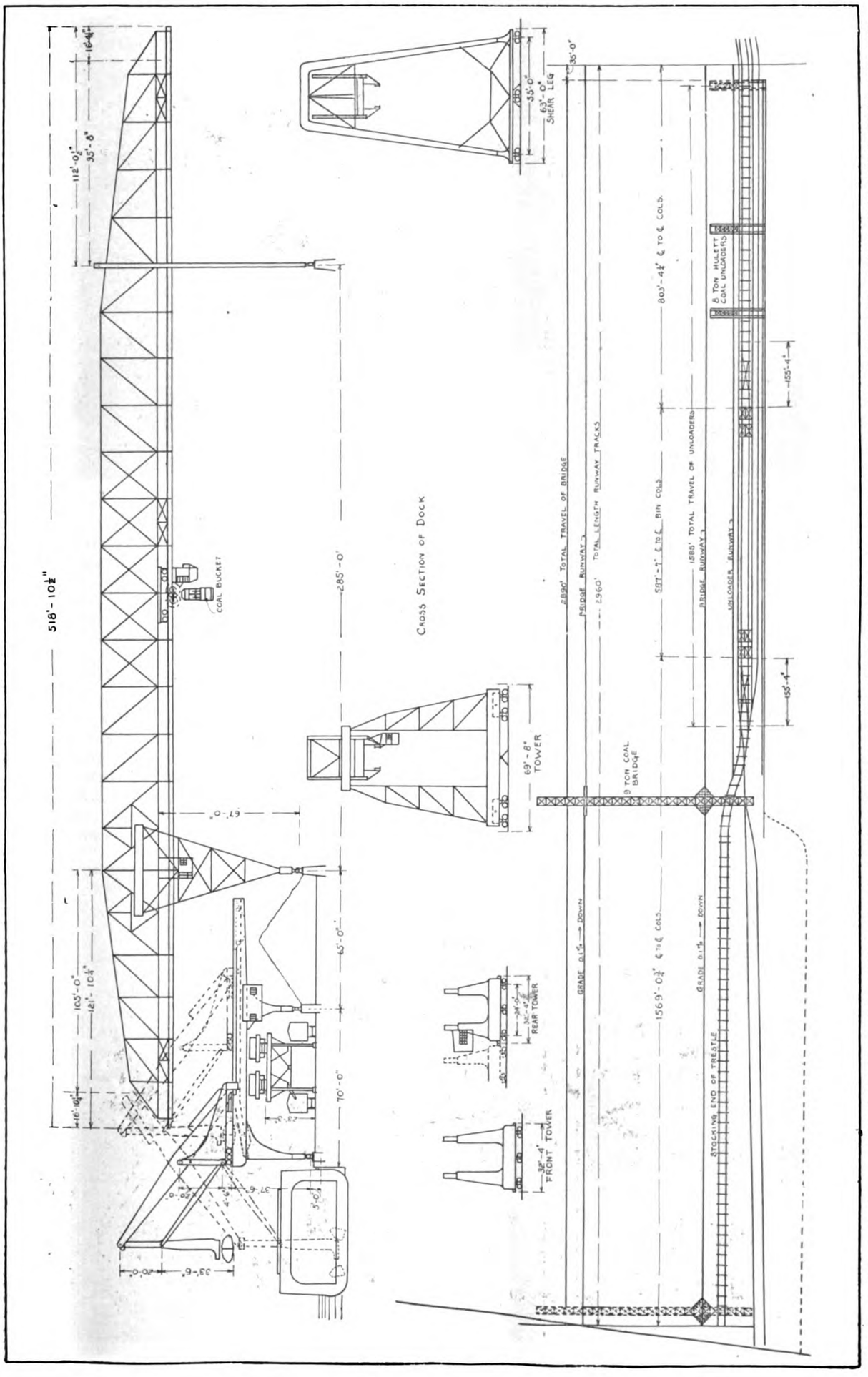
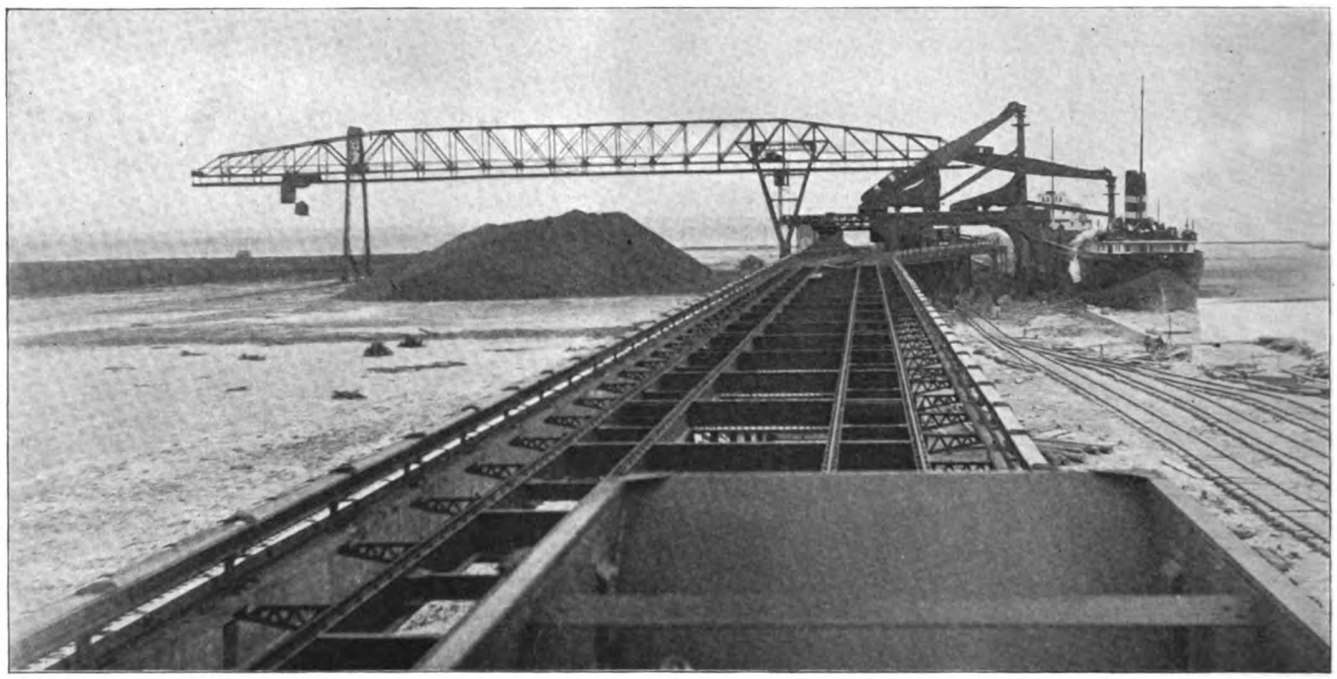


FIG. 1.—LAYOUT AND CROSS-SECTION OF CANADIAN PACIFIC RAILWAY CO.'S COAL UNLOADING DOCK AT FORT WILLIAM, ONT., EQUIPPED WITH TWO HULETT COAL UNLOADING MACHINES AND CONVEYOR BRIDGE

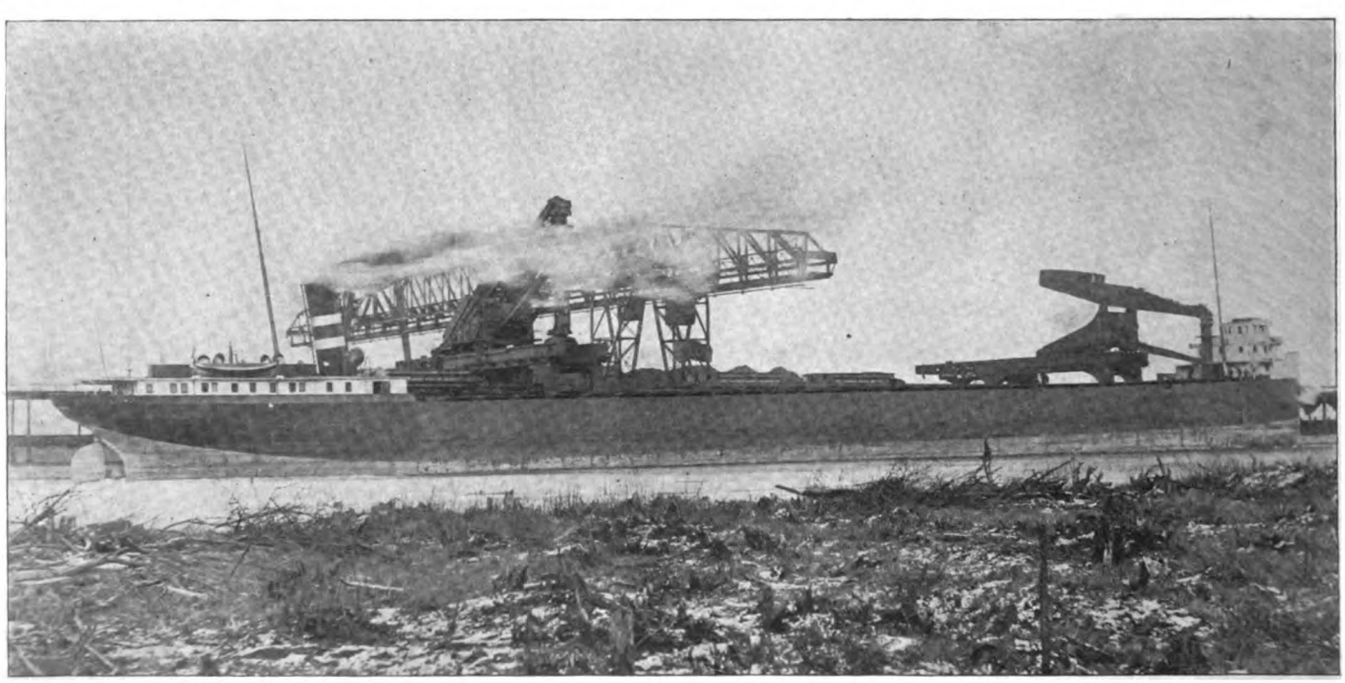


BROADSIDE VIEW OF THE HULETT COAL HANDLING BRIDGE AT FORT WILLIAM

ton rehandling bridge, three 35-ton scale larries, 3,000 ft. of bin and trestle work, as well as Christie box car unloaders. The plan of operation is indicated on the accompanying drawing, Fig. 1. The coal is taken out of the boats with the unloaders and deposited at the front of the dock in a so-called bucket car. The unloader then returns to the hold for another load, and while securing it the bucket car is drawn back over the bin and trestle system and the coal deposited in scale larries for distribution into the various bins. If the coal, however, is not wanted for immediate shipment, it is hauled out further onto the cantilever of the unloader and put into a temporary storage pile which has the same capacity as the vessel. The boat can therefore be unloaded and the coal disposed of independent of the rest of the plant.

Coal which is wanted for immediate shipment and deposited in the bins is weighed into the bins by the scale larries. There are 30 bins, 15 on each side of the trestle, each capable of holding a carload of coal.

A drag of cars is brought in on each side of the trestle and broken up and spouted at each of the bins. The box car unloaders travel beneath the bins and are of special design, working out on either side through the supporting posts of the trestle, so that they can start at one end of the bin system and work down through, loading all the cars on one side. While these cars are being hauled away and replaced by empties, the box car unloaders work back, loading the cars on the other side of the trestle, in this manner giving continuous operation. The contents of each bin are weighed in to correspond with the capacity of the car. The car when released is at once ready for main



THE BULK FREIGHTER ANDREW S. UPSON UNDER THE HULETT COAL HANDLING MACHINES

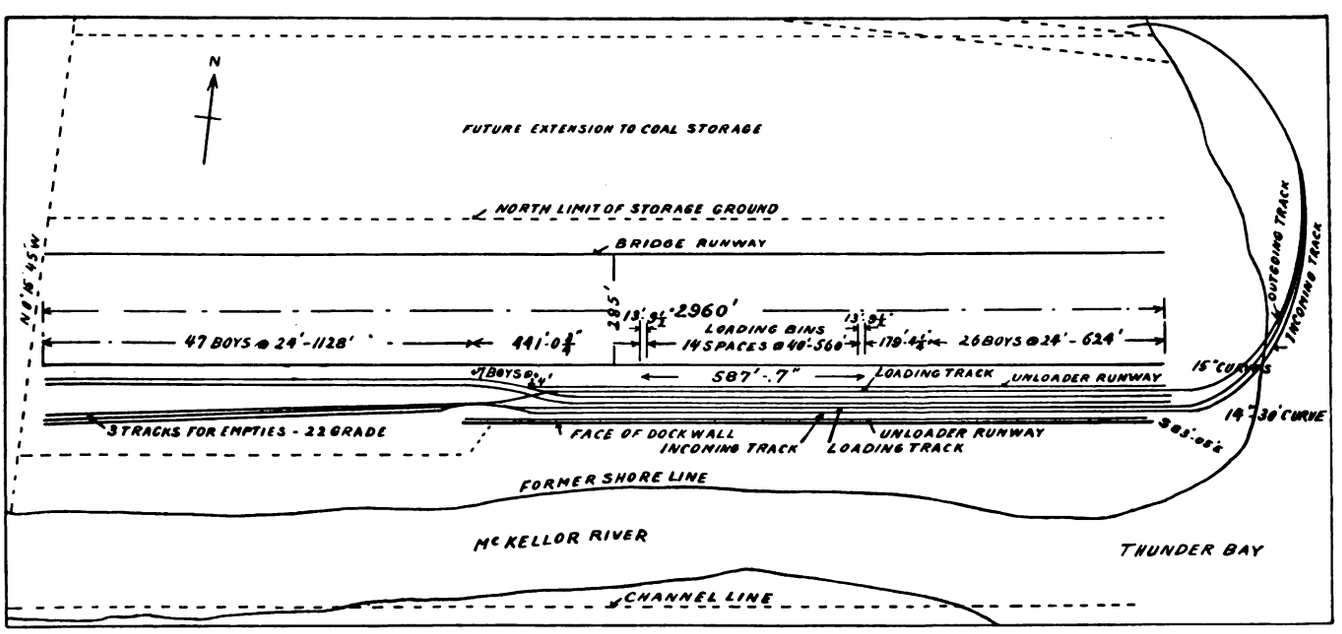
line service without further trimming. This weighing feature is a new departure on coal docks, but has been used extensively on the Lake Erie ore docks for the past two or three years. The transfer cars as well as all other machines on the dock are electrically operated. The same cars are also used in rehandling coal for storage, running out on the trestle and receiving their load opposite the rehandling bridge wherever stationed. The trestle is a double-track system with suitable cross-overs so that cars can be kept in continuous operation. The coal going into the permanent storage is rehandled out of the temporary storage pile under the rear of the unloaders by the rehandling bridge. It will be seen from Fig. 2 that the rehandling bridge carrying a 9-ton bucket has a cantilever covering this storage pile as well as extending out over this trestle system. Coal is taken out of the temporary pile, carried back and deposited in the main storage by this bucket. A still further storage is provided by an extended cantilever on the rear of the bridge.

The bridge is 520 ft. over all and carries the largest coal bucket ever constructed, the one bridge being ample to take care of all the coal that the two unloaders can remove from the boats. The dock handles railroad coal only, and no attempt is made to separate grades. In other words, a screening plant is not installed. The important feature of the equipment is the separation of the unloading from the shipping and rehandling machines. The unloaders, the bin system and the bridge are all absolutely independent of each other in their operation. The bridge can be shipping out coal from one end of the dock while the unloaders are receiving coal on another portion. When there is no boat at dock the bridge can clear the temporary storage and prepare it for the accommodation of incoming boats.

The power for the operation is furnished first as high tension, alternating current, and is transformed at the dock into direct current which enables the use of dynamic braking on the machines. The machines are controlled in a very simple manner, very similar in fact to the operation of the elevator in an ordinary office building, the motors being used for lowering as well as hoisting the loads. The manual work devolving upon the operator in the machine is very light, enabling high speeds to be obtained. The coal being handled in large units and prevented at all points from dropping, is broken much less than with the ordinary grab bucket system. The motor equipment on each of the unloaders totals 550 h. p., and the bridge has motors aggregating 700 h. p. The unloaders are built entirely of steel and weigh in the neighborhood of 600 tons each.

The plant was installed by the Wellman-Seaver-Morgan Co., of Cleveland.

George W. Andrews, former president of the American Association of Passenger Agents, and for many years general agent of the Pacific Coast Steamship Co., Seattle, Wash., died on Sept. 25.



GENERAL PLAN OF THE CANADIAN PACIFIC RAILWAY CO.'S COAL DOCK AT FORT WILLIAM

Deep Sea and Lake Sailing

By H. A. Creveling

The sailor's life on the deep seas and the lot of the seaman on the Great Lakes are as widely different in most respects as a man-of-war and a canal boat.

It has been my fortune to ship both on salt water and lake vessels. The Great Lakes sailor has conditions altogether in his favor. The conditions under which he lives are better and he has more chances.

A strange chain of circumstances which has no place in this story, led me from the forecastle of a big English liner, following a Mediterranean voyage, to the shipping office of the Lake Carriers' Association, in Cleveland. The men who sat about me, awaiting their turn to be shipped, looked for the most part to be plain American working men. In vain I looked for the assortment of foreigners of every description that lounge about the New York shipping bureaus. When my turn to go out as a deck hand came, I made my way a trifle reluctantly to the docks where the big ore boat was tied up, for visions came to me of the salt water forecastle, with its crowded rooms. The old-time shipmates were of every country under the sun; rarely could they all talk in the same tongue. The bunks, each with its worn out tick and two blankets, were most uninviting. And I thought of the daily fare, the tough salt meat, the soggy bread and the weak wine.

However, I was not destined to harbor such thoughts for long. A stout, jovial looking man, whom I after-

wards learned was the second mate, met me with a questioning glance as I crossed the gang plank. I said, "deck hand," and was directed to the crew's quarters aft. Such quarters! The room was large, well ventilated and above deck. Two windows supplied plenty of light and sunshine. The door and windows were screened. The walls were covered with postcards and pictures clipped from magazines, lending a cheerful air to the surroundings. Six bunks, in three tiers, were far enough apart to allow space for a table and chairs. In one corner of the room was a wash bowl with hot and cold water, and over it hung a large mirror. But, most marvellous thing of all, closer inspection revealed real sheets, pillows, blankets and comforters on the beds, and they were clean!

With the ringing of the dinner bell the other five deck hands came romping into the room like so many school boys, their faces wreathed in smiles, and I thought of the dark visaged, grim, discontented men of the deep seas. Still another surprise awaited me in the mess room, where the deck hands and firemen eat. The humorous tales of deck hands breakfasting on rivet heads and when sick dieting on ginger snaps were made the more humorous by the repast which greeted my eyes and nostrils, and which my palate was soon to welcome. Soup, roast beef, veal, mashed potatoes, stewed tomatoes, succotash, corn bread, hot biscuit, fresh onions, cucumbers, cakes, pie, coffee we sighted down the board. Best of all, there was cleanliness.

The meals kept up to this standard during the trip, owing to the brief time between ports and the ease with which fresh provisions can be obtained. But on salt water the food is apt to be far from inviting after two or three weeks from port.

The work was not hard. We painted and scrubbed nine hours and one-half a day, with Sundays off. If necessary work kept us up at night, time off was given the following day to even things up. These seemed regular bankers' hours, compared with the ocean dog watches.

Orders were given as a rule in a pleasant, cordial manner. There was no fear of blows, nor "logging", the method of fining for mistakes and disobedience on foreign salt water boats. If a sailor there, through inexperience or sickness cannot do his task, he is apt to find his existence pretty miserable. An unwritten rule on salt water seems to have "if a man is too sick to work, he is too sick to eat." He may be cursed by the officers and scoffed at by the crew, so that oftentimes he stands by his job till he drops.

But on the lakes a sick man receives as much attention as if he were among his friends ashore. If he is unable to perform his task, the mate will usually find him one more suited to his ability. The lake deck hand has absolutely no responsibility. He is paid to do only what he is told. Five days convinced me that the average business man would enjoy nothing better than to trade lots with a deck hand on an ore boat for a few weeks.

But what becomes of the deck hand? If he is so inclined, he can, after a few months' sailing, go watching or wheeling, when he will sleep forward in nicer quarters and eat in the dining room with the other officers.

A deck hand is paid $31.50 per month in the summer season, and $40 in the fall. A watchman or wheelsman receives $52.50 in the summer and $65 in the fall. An able-bodied seaman on salt water, who has served his three-year apprenticeship, is paid approximately $20 per month. A watchman on the lakes can save nearly $400 in the course of a season. Not many men, of the class which ordinarily takes to steamboat life, have such an opportunity. I know one deck hand who owns 320 acres of land in Montana and 10 acres in Florida. He is saving money to work his farms. Another has 20 acres in California and a small sailors' supply store in Superior, Wis. Another owns too small restaurants in Cleveland. His brothers run them for him, while he saves money for a rainy day.

These are instances of men who are only deck hands, and likely will never be more on a steamboat. But a little education and training opens up the fields of navigation or marine engineering and any young man with grit and intelligence, one who does not mind a little grime and hard work, in a comparatively short time, can obtain his master's or chief engineer's papers and earn the lucrative salary which goes with such a berth.

The sailor's life on the Great Lakes is, taken altogether, a clean and happy one. His shipmates are usually wholesome, hearty fellows. The discipline and the training and the good, fresh air are a boon for any man who likes the big outside.

Major R. R. Raymond, government engineer, Wilmington, Del., received the following bids for constructing the steel sea-going suction dredge Minguas: Ellicott Marine Corporation, Baltimore, Md., $198,000; Spedden Ship Building Co., Baltimore, $186,390.

Work at Union Iron Works

The Union Iron Works, San Francisco, Cal., is quite busy at present. The new work consists of a large floating steel caisson for the Panama canal, an oil tanker for the Associated Oil Co., a wooden oil barge with steel cylindrical tanks for the Brown Towing & Lighterage Co., three submarines for the United States government, two large suction dredges and one small motor-driven steel oil barge for the Standard Oil Co.

The caisson will be 113 ft. 10 in. long, 65 ft. deep, 36 ft. breadth, light draught 32 ft, and extreme draught 61 ft. The caisson will be equipped with a pumping system for unwatering the lock chambers and consists of four 20-inch centrifugal pumps, electrically driven.

The oil tanker will be 426 ft. 9 in. long over all, 55 ft. 3 in. beam and 31 ft. 8 in. deep to upper deck. Her engines will be triple-expansion, 26½, 45 and 75 in. diameter by 48 in. stroke, supplied with steam from four Scotch marine boilers.

The Standard Oil barge will be 116 ft. over all, 24 ft. molded beam, 10 ft. 3 in. molded depth and 8 ft. 6 in. draught. Four single-ended Scotch boilers will be installed, 11 ft. 9 in. long and 14 ft. in diameter.

The largest repair job at the yard is that of the steamer Newport, owned by the Pacific Mail Steamship Co., which sunk at Panama when the government pier collapsed, badly damaging the steamer.

The Santa Clara, of the Northern Pacific Steamship Co., in in dry dock undergoing extensive repairs, and the Mexican, of the American-Hawaiian Steamship Co.'s fleet, and the Hyades, of the Matson Navigation Co.'s fleet, are awaiting annual overhauling.

The Taikoo Dock Yard at Hong Kong, China, recently launched a motor-driven ship 220 ft. x 32 ft. x 9½ ft. for the Asiatic Petroleum Co., being the largest motor vessel ever built in Asiatic waters. The motive power will be supplied by two 240-H. P. four-cylinder Bolinder motors, using crude oil fuel.

The Maryland Steel Co., Sparrow's Point, Md., has been awarded contract by the Pennsylvania Railroad Co. for two steel steam lighters, 120 ft. long and to cost $60,000.

R. A. Perry, Oakland, Cal., has been awarded contract for dredging a 30-foot channel at the entrance to Mare Island Strait on his bid of $197,000.

Safety at Sea

Secretary of Commerce Redfield's Committee on Aids and Perils to Navigation to prepare recommendations for the use of the American delegation to the London International Conference on Safety at Sea has made its report, recommending that—

1. All ocean-going steamers equipped with electricity shall carry a searchlight so placed as to illumine all points of the horizon as far as practicable, and of sufficient power to distinguish a ship's 24-ft. boat at a distance of not less than one nautical mile on a clear, dark night.

2. All light vessels on important outside stations shall be equipped with submarine bells. All ocean-going vessels shall be provided with means for detecting submarine-bell signals.

3. The committee recommends that the international rules of the road be modified so that carrying of range lights shall be obligatory instead of optional, as at present, and that all vessels shall also carry a fixed stern light. The international rules shall also be amended to provide that every vessel navigated in the vicinity of icebergs or ice floes during darkness should go at moderate speed, having careful regard to circumstances and conditions; the use of rockets showing red should be restricted to distress signals at night.

4. The application of radiotelegraphy to the collection of weather reports from oceanic areas gives promise of securing to navigators a greater measure of safety from the perils of the sea than has hitherto been possible. Such a service necessarily would be international in character, the expense of which should be shared jointly by the nations most directly concerned. The committee recommends, in the interests of the future development of radio-meteorological services, that the existing meteorological service of each administration adopt as part of its program the organization of a radio service for coastal waters pertaining to that administration.

5. The committee recommends that meteorological observations be made at Greenwich noon whenever a vessel during the preceding four hours has experienced a barometer reading below 30 inches and falling continuously, or has discovered other symptoms of approaching storm. That class of meteorological information which transcends all others as regards its value to shipping is the storm or hurricane warning, particularly the latter. It should not be a difficult matter to ultimately provide a system of warnings for these destructive storms, which shall be little, if any, inferior to the system of warnings for storms which pass over the land. The committee considers this warning service as promising more beneficial results than the project of distributing warnings to vessels in mid-ocean, and therefore emphasizes the importance of concentrating all means at the command of meteorological services on the development of an efficient warning service for coastal and sub-tropical waters.

6. The United States naval observatory has developed a time service by radio which has proved of great value to shipping, and the committee recommends a consideration of the desirability of requesting all governments to establish a like service.

7. For many years the important steamship lines traversing the North Atlantic Ocean between New York, Philadelphia, Boston and the ports of Europe have agreed among themselves that their vessels should hold to certain prescribed lanes. This plan should be broadened by making the steamship lanes obligatory to steamships. Governments should pass legislation requiring the steamships under their respective flags to adhere strictly to steamship lanes prescribed by them. These lanes should be agreed upon in the international conference.

8. The committee recommends that an international ice patrol be established, and that the annual responsibility and expense of maintaining this patrol be assumed by each of the several maritime nations in turn, the patrol to be conducted in accordance with a general plan to be formulated and agreed to by the several maritime nations concerned at the international conference. The ice patrol shall begin April 1 of each year and continue until the ice no longer constitutes a menace to navigation in the zone of the trans-Atlantic steamship lanes. At all times during the continuance of the patrol there must be at least one vessel present in the iceberg region. The patrol vessels will determine the southerly, easterly and westwardly limits of the ice, and keep in touch with these fields as they move southward, in order that radio messages may be sent out daily giving the whereabouts of the ice, particularly ice in the vicinity of the regular trans-Atlantic lanes.

9. The committee recommends that an endeavor be made to reach an agreement with the several maritime nations interested in the trans-Atlantic trade, as follows: The United States to continue the destruction or removal of derelicts in the North Atlantic west of a line drawn from Cape Sable to latitude 34° longitude 70°, and thence to the Bahamas, and other maritime nations to maintain a suitable vessel or vessels for the purpose of destroying or removing derelicts east of said line.

The committee comprised George F. Cooper, captain United States navy, hydrographer, chairman; E. P. Bertholf, captain, commandant, United States revenue cutter service; G. R. Putnam, commissioner of lighthouses; A. J. Henry, professor of meteorology, weather bureau; E. T. Chamberlain, commissioner of navigation.

Hulls and Bulkheads

Secretary of Commerce Redfield's committee on hulls and bulkheads, to prepare recommendations for the use of the American delegation to the International Conference on Safety at Sea, to be held in London, Nov. 12, has made its report.

The committee emphasizes the fact that definite information concerning many of the important questions could only be obtained through careful and exhaustive research by a body of experts having at their command ample resources to prosecute their investigations to a satisfactory conclusion. Such a body of experts under the jurisdiction of the department of commerce was recommended by the committee, it being pointed out that it would assist in the execution of rules already established, would facilitate and encourage improvements in ship construction, and tend to increase the safety of passengers and crew.

The principal conclusions of the committee were in substance as follows:

There should be prescribed by regulation under authority of law the maximum and minimum freeboard for all classes of vessels. Standards of hull construction should be prescribed after careful investigation by experts, and the rules of classification societies should be treated on their merits and approved or disapproved accordingly.

Complete investigation should be made as to what reserve of buoyancy should be provided for in the design of a vessel under certain specified conditions of damage.

For trans-oceanic vessels which are essentially cargo carriers and in which extensive sub-division of hull by transverse bulkheads would be impracticable, ample boat capacity at the davits on each side should be provided for all persons on board, so that in the event of collision or other accident damaging the boats on one side

there would be ample life-boat capacity on the opposite side for all persons on board.

Rules and curves should be established for fixing a "margin-of-safety line" under which a vessel would not sink under certain conditions of damage; these rules and curves to be determined after complete investigation. Investigation should also be made and regulations prescribed for certain classes of vessels governing the maximum number of adjacent main compartments which could be flooded without jeopardizing the safety of the vessel.

It is considered necessary to formulate and prescribe rules for spacing, strength and tests of water-tight bulkheads.

The advisability of having the "bulkhead deck" continuous fore and aft, introducing water-tight decks or flats below the bulkhead deck and fitting at side continuous or partially continuous fore and aft water-tight bulkheads, should be carefully considered for each type of vessel involved.

Openings in main transverse and longitudinal water-tight bulkheads, except as absolutely necessary for the trimming of coal, should be permitted only under exceptional conditions.

Water-tight bulkhead doors should be controlled from the bridge and capable of operation at the door; also, for water-tight doors in important water-tight bulkheads, independent mechanical operation from the bulkhead deck is desirable.

All lights below the bulkhead deck should be fixed, except under unusual circumstances, due to type and size of vessel and location of bulkhead deck.

In wake of machinery spaces and other large compartments of certain classes of large passenger vessels double bottom or its equivalent should extend to the deck above load water line.

It is also considered desirable that for such vessels the double bottom should extend not only under the engine room, but also under all main compartments forward and abaft engine and boiler spaces.

The committee comprised Rear Admiral Washington L. Capps, chief constructor, United States navy; Naval Constructor David W. Taylor, United States navy; George Uhler, supervising inspector general, steamboat inspection service, and E. T. Chamberlain, commissioner of navigation.

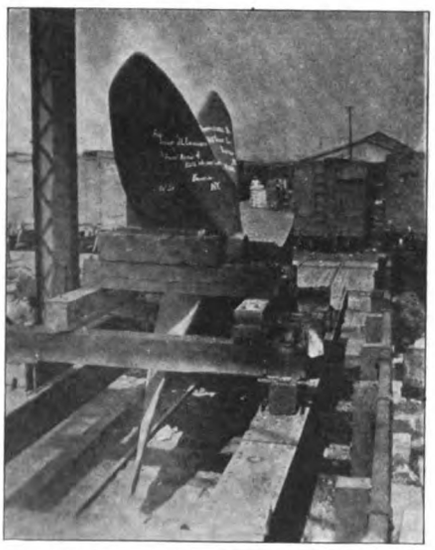
The Amalgamated Paint Co. has secured larger offices at Pier 11, North river, foot of Liberty street, New York.

Delegates to Conference

The delegates which will represent the United States at the International Conference on Safety at Sea, to be held in London Nov. 12, will consist of the following members: Representative J. W. Alexander, of Missouri, chairman of the Committee on Merchant Marine; Senators Fletcher, of Florida, and Burton, of Ohio; Eugene Tyler Chamberlain, commissioner of navigation; Capt. E. P. Bertholf, commanding Revenue Cutter Service; Rear Admiral Washington L. Capps, formerly chief constructor United States Navy; Capt. George F. Cooper, hydrographer United States Navy; Capt. W. H. G. Bullard, superintendent Naval Radio Service; Homer L. Ferguson, general manager Newport News Ship Building & Dry Dock Co.; Albert Gilbert Smith, vice president of the New York & Cuba Mail Steamship Co.; Andrew Fursuth, head of the Seamen's Union, and George Uhler, supervising inspector general of the Steamboat Inspection Service.

Casting a Large Propeller Wheel

The H. G. Trout Co., of Buffalo, cast recently for the ocean-going steamer J. L. Luckenbach, one of the largest solid propeller wheels ever molded in the United States. The wheel was 18 ft. 6 in. diameter, with an 18-ft. pitch, and the work was done by Casper Klausch and Charles Smith, under the supervision of H. G. Walker, the foundry superintendent. The casting weighed over 20,000 pounds finished, bored and key-seated.



PROPELLER WHEEL FOR J. J. LUCKENBACH

The usual method of molding these wheels in the Trout foundry is in pits with removable copes and drags running them into the core ovens on cars, drying them and then reassembling them in the pit for casting. As this wheel was larger than usual and left-hand as well, the superintendent did not care to make an entire new iron rigging for the job. The pattern was bolted in the pit, as usual, then plumbed around for a scribing of bottom plates. On these the bottom part to the parting was built upon loam style, but with sand and a dry sand facing. An iron cope was then rammed up with dry sand in the usual manner.

Not having the regular drag half boxes fitting the iron stands of the pit, special care was taken to work from the pitchometer in proving the pitch of the pattern and in all sweeping out. The copes were oven-dried, the drag skin-dried, and every part again proved up carefully with the pitchometer during the assembling of the mold. The "holding down" was also a special "get up", as the regular pit fastenings could not be used. In view of this, there was special pride taken in the fact that the casting showed no evidences of strain and that when the wheel was proved up with protractors in the machine shop each part of every blade was true to pitch and all blades true to each other.

Had the wheel been a right-hand propeller, 20 ft. in diameter, it could have been made in the regular way, but to make a left-hand one of this size and turn it out perfect without the regular rigging was a job to be proud of.

Lake Ship Building

R. C. Davis, president of the Chicago, Duluth & Georgian Bay Transit Co., Chicago, has closed contract with Antonio C. Pessano, president and general manager of the Great Lakes Engineering Works, for a steel passenger steamer to be in a general way a duplicate of the steamer North American, turned out last spring for this same company. The new passenger steamer is to have sleeping quarters for 540 passengers or 90 more than the North American can accommodate. Her general dimensions will be: Length over all, 316 ft.; keel, 291 ft.; beam, 47 ft. She will be equipped with quadruple-expansion engines, cylinder diameters 21.5, 30.75, 44.5 and 64 in. with stroke of piston, 36 in. Steam will be supplied by three Scotch boilers, 14 ft. in diameter and 12 ft. long, allowed 215 lbs. working pressure. She will be named the South American.

Mr. Pessano also recently closed for a package freight carrier for the Atlantic coast trade, and a bulk freighter for the stone trade of the great lakes.

The Collingwood Ship Building Co.,

Collingwood, Ont., has received an order from the St. Lawrence & Chicago Steam Navigation Co., of Toronto, for a bulk freighter, to be 549 ft. over all, 529 ft. keel, 58 ft. beam and 31 ft. deep, to be delivered next spring. This is the second bulk freighter to be ordered by Canadians for 1914 delivery. The other vessel is building at the yard of the Western Ship Building & Dry Dock Co., at Port Arthur, Ont., and when completed, will be the largest bulk freighter on the lakes, being 625 ft. long, or 8 ft. longer than the Col. J. M. Schoonmaker.

James C. Wallace, president of the American Ship Building Co., has closed contract with Pittsburgh parties for a bulk freighter to be practically a duplicate of the Quincy A. Shaw, of the Hanna fleet, and to come out next spring. The new steamer will be built on the Isherwood system and will be 524 ft. long over all, 504 ft. keel, 54 ft. beam and 30 ft. deep, having triple-expansion engines with cylinders 23, 38 and 63 in. diameter by 42 in. stroke. Steam will be supplied by two Scotch boilers, 14½ ft. diameter and 11½ ft. long, allowed 170 lbs. pressure. This is the second order

It is not expected that the program of new construction will be heavy this winter, though a few orders may be placed. However, the ship yards will have considerable remodeling to do as a number of owners have decided to better adapt the older type of vessels to the unloading machines by the removal of 'tween deck stringers and stanchions and by the substitution of arch girders between hatches, which will be spaced 12 ft. centers.

The Toledo Ship Building Co., Toledo, has been given contract for so remodeling the steamers H. W. Smith and M. C. Smith, of the Great Lakes Steamship Co.'s fleet. Hutchinson & Co. will also remodel the steamers J. T. Hutchinson and Harold B. Nye. The hatches of the steamers will be changed to 12 ft. centers and the boilers will be shifted from the main deck to the tank top. Other managers are also contemplating similar modifications in hull structure and with a great deal of this class of work going on, as well as the usual repairs, the ship yards of the lakes will put in a busy winter.

Bids were also opened for dredging approximately 6,875,000 cubic yards in the Texas City channel from Bolivar Roads to Texas City section as follows: Bowers Southern Dredge Co., Galveston, $799,342.50; R. A. Perry, San Francisco, $826,093.40; P. Sanford Ross, Jersey City, N. J., $935,-698.50; Southern Dredging Co., Mobile, Ala., $856,741.60; P. B. Miller, Houston, Texas, $818,492.40.

Diesel Engined Ship Wotan

The Diesel motor tank ship Wotan, built by Reiherstieg-Schiffswerfte und Maschinenfabrik, of Hamburg, fitted with a six-cylinder, two-cycle, Carels-Reiherstieg-Diesel engine, owned by the German-American Petroleum Gesselschaft, made its maiden trip across the Atlantic ocean, arriving in New York port from Hamburg on Oct. 3. The last European stop was Southampton to put off some visitors that sailed on the ship from Hamburg.

The trip was made from Southampton to New York in 15½ days, with an average speed of 8.1 knots, the engine turning at 79 r. p. m., developing 2,250 I. H. P., with a daily fuel consumption of 7 tons of oil, or 131 grammes per indicated horsepower hour. This fuel consumption covered the main engine, steering engine and lighting set. Not a stop was made from Southampton until New York harbor where they took on the pilot.

A thorough investigation or overhauling of the engine does not disclose a single discrepancy or necessity of repair of any nature whatever. This is considered a remarkable feat, in lieu of the engine and ship being on its maiden trip. The ship took on its cargo and sailed from New York on Oct. 8 for the home port at Hamburg.

While in New York harbor, the ship was visited by a great many representative naval and mechanical engineers, as well as representatives of large manufacturing and financial interests, and without an exception they all have only words of praise for the type of engine installation made on this ship.

This engine is the open frame Carels two-cycle reversible marine Diesel engine. The main propelling engine has fitted on it the bilge pump, circulating water pump, oil pumps and steering compressor, so that in itself it is a complete propelling engine plant. The auxiliary pumps were not fired from time of leaving the European port until reaching New York, as the ship was steered by air from the steering compressor on the engine.

An item of interest is to compare the volume of fuel consumed in this ship with that of a steamship of equivalent capacity, as the owners of this ship are operating a line of steamships of the same capacity, and it is demonstrated that the cargo of fuel for the same radius of operation would be at least four times as great, in a great many cases five times, in a steam engine than in a Diesel engine.

The fuel bunkers on this ship provided for 900 tons of oil and would permit the ship to travel 30,000 miles without taking on an additional cargo of fuel.

The Wotan is built on the Isherwood system of construction and her dimensions are: Length, 404 ft.; beam, 52 ft. 3 in.; depth, 29 ft. 6 in., with a draught of 23 ft.

When loaded she carries 6,780 tons of oil, in addition to carrying 900 tons of bunker oil and 100 tons of water.

A great item of interest in this ship is that it is a single screw ship, six cylinder installation, in which the engine is complete and self-contained, including the steering compressor, while the other motorships in service, such as the Hagan and Christian X, have in addition to two propelling engines of six or eight cylinders three or four cylinder auxiliary engines to develop the injection air for the operation of the main engine.

Comparing the voyage of the Wotan with that of steamships using coal, Captain Smith, of the foreign bureau of the Standard Oil Co., said:—

"The voyage was a splendid success and demonstrates once again that oil is the coming fuel for all ocean-going and coastwise vessels. Such statistics as we have at hand show that the most modern steam engines consume 1½ lb. of coal to produce 1 H. P. per hour. If the coal is replaced by oil as fuel one pound of oil will produce a horsepower every hour. But on vessels such as the Wotan the record is even better, because in the Diesel motor only one-half a pound of oil is needed to develop one horsepower per hour.

All this may sound intricate, but it is vital. It shows that the same quantity of oil used in a Diesel motor will generate twice as much energy as if the oil were burned under the boilers, or three times as much energy as the same weight of coal burned under the boilers.

"The showing of the Wotan, in not once having to stop her engines, proves oil to be as dependable as coal for fuel purposes. In addition to the increased energy the oil driven craft save, approximately, two-thirds in the weight of the fuel required for the voyage, with a corresponding increase in the vessel's cargo carrying capacity. In other words, the weight of the fuel carried by the Wotan was very much less than what it would have been had the vessel burned coal."

Capt. Carle Stege, in command of the Wotan during her voyage from Hamburg, also expressed the highest satisfaction with the way the vessel had behaved.

"The Wotan is a splendid, clean ship and one of the best of her kind to be found anywhere."

Society of Naval Architects

The twenty-first annual meeting of the Society of Naval Architects and Marine Engineers will be held in the Engineering Societies' building, 29 West Thirty-ninth street, New York, on Dec. 11 and 12, concluding with a banquet in the Astor galley of the Waldorf-Astoria on the evening of the 12th. The program of papers follows:

"Relative Resistance of Some Models with Block Co-Efficient Constant and Other Co-Efficient Varied."—By Naval Constructor D. W. Taylor, U. S. N., vice president.

"Expansion and Contraction of Certain Dimensions and Their Effect on Resistance".—By Professor H. C. Sadler, member of council.

"Experiments on the Fulton; Effect of Bilge Keels".—By Professor C. H. Peabody, member of council.

"Structure of Vessels as Affected by Demand for Increased Safety".—By William Gatewood, member.

"A Substitute for the Admiralty Formula".—By E. A. Stevens Jr., member.

"Diesel Engine as Regards Marine Propulsion".—By John Reid, member.

"The Evolution of the Lightship".—By George C. Cook.

"Construction and Operation of Western River Steamers".—By R. C. Wilson.

"The Influence of National Policies on Ships Design".—By Captain W. L. Rogers, U. S. N.

"Strains in Hulls of Ships, Showing the Effects of Pitching and Rolling".—By James E. Howard.

"Change of Shape of Recent Colliers".—By Naval Constructor S. F. Smith, U. S. N., member.

"The Safety of Passenger Ships at Sea".—By G. W. Dickie, vice president.

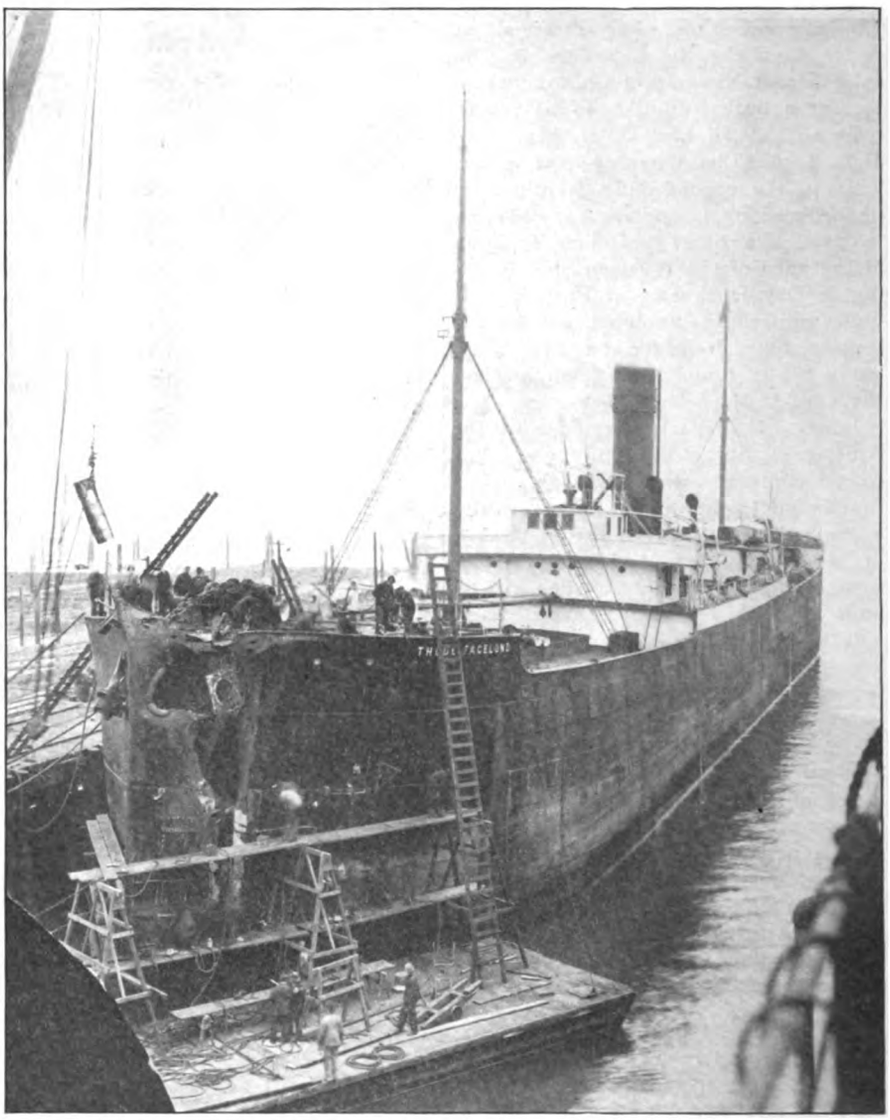
"General Organization of a Navy Yard".—By Captain L. S. Van Duser, U. S. N., associate member.

"Stability of Life Boats".—By Professor H. A. Everett, member.

"Notes on the Performance of S. S. Tyler".—By E. H. Rigg, member.

Collision Off Columbia River

The Norwegian tramp steamer Thode Fagelund, which was in collision with the German barge Thielbek off the Columbia river, is being repaired at the yard of the Seattle Construction & Dry Dock Co., Seattle, Wash. It was a head-on collision, the sailing vessel crashing into the steamer's port bow, cutting it open from just below the waterline to the railing. The Fagelund was en route to Panama with 3,500,000 ft. of lumber and 1,037 cases of dynamite. It is considered quite remarkable that the dynamite did not explode. The photograph shows the general nature of her injuries.



NORWEGIAN STEAMER THODE FAGELUND, DAMAGED IN COLLISION WITH THE GERMAN BARK THIELBEK

Breakwater in Limon Bay

The government has practically decided to build an east breakwater in Limon Bay on the Atlantic side of the Panama canal. The west breakwater from Toro Point is practically complete and affords complete protection against "Northers". It does not, however, protect against wave action produced by the "Trades" which prevail almost constantly during the dry season. It was found that during the visit of the Atlantic fleet to the canal it was a difficult matter to reach the vessels at anchor under lee of the west breakwater, owing to the strong "Trades" blowing, which made it hazardous for small boats to reach the ships. Moreover, it has been discovered that the trade winds washed the shores of Limon Bay in the vicinity of the canal entrance and carried silt into the channel amounting to 2,000,000 cubic yards per annum. It is proposed to extend the new breakwater from Coco Solo Point on the east side of the Bay of Manzanillo. Rock will be obtained from the quarries at Porto Bello if a more convenient quarry is not located meanwhile.

Alfred Noble, of New York, who was detailed by the Navy Department to report on the condition at the site of the new dry dock under construction at the naval station at Pearl Harbor, H. I., is expected to make his report shortly. He gave a preliminary report some time ago that the construction of a graving dock upon the site was feasible. His later report will contain recommendations for the reconstruction of the dock. Alfred Noble built the Weitzel dock at the Sault and was one of the consulting engineers of the Pennsylvania tunnel under the Hudson river at New York, and the Panama canal.

Iron Ore Shipments

The movement of Lake Superior iron ore reached 7,258,413 tons in September, a decrease of 28,817 tons from the movement of September, 1912. Both August and September this year have sent forward less ore than the corresponding months of last year, proving shippers are curtailing somewhat, due in all likelihood to the uncertainty of some blast furnaces over their future requirements. It has been known that some of the furnaces have been desirous of throwing into next year ore ordered for this year's delivery. However, the total of such cancellations as yet is unimportant.

The movement to Oct. 1 totals 39,265,484 tons, as against 36,338,382 tons for the corresponding period last year, an increase of 2,927,102 tons. Last year the fleet moved 7,010,219 tons in October and 4,072,674 tons in November and to close of navigation in December, a total of 11,082,893 tons. The November movement is not expected to equal that of last year.

Following are the shipments by ports during September and to Oct. 1, with corresponding data for last year:

Port.	Sept., 1912.	Sept., 1913.
Escanaba	770 974	673,591
Marquette	566,178	418.242
Ashland	757,764	485,174
Superior	2,031,086	2,224,553
Duluth	1,652,735	1,938,823
Two Harbors	1,508,493	1,518,030
	7,287,230	7,258,413
1913 decrease		28,817

Port.	To Oct. 1, 1912.	To Oct. 1, 1913.
Escanaba	4,010,985	4,297,223
Marquette	2,567,578	2,573,604
Ashland	3,623,161	3,558.802
Superior	11,097,276	10,810,391
Duluth	7,729,187	9,830,726
Two Harbors	7,310,195	8,194,738
	36,338,382	39,265.484
1913 increase		2,927,102

Lake Erie Ore Receipts

Out of a total of 7,258,413 tons of ore shipped during September, 6,047,446 tons were received at Lake Erie ports, distributed as follows:

Ports.	Gross tons.
Buffalo	697,379
Erie	159,480
Conneaut	1,233,366
Ashtabula	1,258,741
Fairport	296,880
Cleveland	1,390,349
Lorain	650,908
Huron	97,326
Sandusky	.....
Toledo	212,865
Detroit	50.152
Total	6,047,446

Commerce of Lake Superior

The commerce of Lake Superior as measured by the canals at Sault Ste. Marie measured 10,910,365 tons during September, a decrease of 579,077 tons from the movement of the preceding month, when 11,489,442 tons were moved. The figures are a slight increase over the movement of September 1912, when 10,467,782 tons were moved.

To October 1 of the present year 60,073,294 tons were moved as against 51,952,708 tons for the corresponding period last year, an increase of 8,120,586 tons. Following is the summary:

EAST BOUND.

	To Oct. 1, 1912.	To Oct. 1, 1913.
Copper, net tons	73,784	72,466
Grain, other than wheat, bushels	29,781.501	63,847,767
Building stone, net tons	2,282	6,181
Flour, barrels	5,222,533	6,722,826
Iron ore, net tons	35,090,169	37,986,011
Pig iron, net tons	11.994	18,348
Lumber, M. ft. B. M.	487,852	442,829
Wheat, bushels	78,173,355	92,811,578
Unclassified freight, net tons	163.278	313,774
Passengers, number	29,899	35,860

WEST BOUND.

Coal, anthracite, net tons	1.321,452	2,110,934
Coal, bituminous, net tons	9,544,129	12,610,557
Flour, barrels	.....	1,263
Grain, bushels	100	400
Mfctd. iron, net tons	447,762	262 812
Iron ore, net tons	6,660	32,376
Salt, barrels	486,719	504,659
Unclassified freight, net tons	946,675	875,335
Passengers, number	32,603	38,395

SUMMARY OF TOTAL MOVEMENT.

East bound, net tons	39,613.431	44,005,765
West bound, net tons	12,339,277	16,067,529
Total	51,952,708	60,073,294
Vessel passages	16,543	17,472
Net registered tonnage	41,127,004	43,198.450

Protesting Against Lafollette Bill

The meeting of passenger steamship men which was held at the Hollenden in Cleveland on Oct. 29 to protest against the passage of the LaFollette seamen's bill was quite representative. A competent committee was appointed to set forth clearly the facts concerning the measure in the belief that when once the public understands its utterly impractical nature insofar as inland waters are concerned, public sentiment will demand its amendment. Among the leading men present were: George A. White, of the Hudson River Day Line, of New York; Stevenson Taylor, of the Fall River Line, of New York; T. F. Newman, of Buffalo; W. F. Herman and Harry R. Rogers, of Cleveland, of the Cleveland & Buffalo Transit Co., A. A. Schantz and D. C. McIntyre, of the Detroit & Cleveland Navigation Co., of Detroit; J. C. Evans, of the Anchor Line, Buffalo; A. W. Goodrich, of the Goodrich Transportation Co., Chicago; J. S. Morton, of the Graham & Morton Transportation Co., of Chicago, Ed. Dustin, of Ashley & Dustin, of Detroit; C. F. Bielman and Frank E. Kirby, of Detroit; Harvey D. Goulder, of Cleveland; L. C. Waldo, of Detroit; J. M. Mulholland, of Cleveland, and E. H. Duff, of Washington, D. C.

The H. W. Johns-Manville Co. has opened a new office and warehouse in Galveston, Tex., making three offices in the Lone Star state—Houston, Dallas and Galveston.

New Atlantic Transport Liner

The Atlantic Transport line recently gave an order to Harland & Wolff, Belfast, Ireland, for the construction of a steamer to be known as the Minnekahda, to be 620 ft. long, 66 ft. beam and of 16,000 tons register. The new steamer will apparently be a very delightful one to travel on as the company has decided to install outside rooms with hot and cold running water, an elaborate lounge and veranda cafe. The Minnekahda will be a triple screw vessel and will make the voyage between London and New York in eight days.

The Union Iron Works, San Francisco, Cal., is building a floating caisson for the Isthmian Canal Commission of the following dimensions: Between vertical ends, 112 ft.; extreme length, 113 ft.; depth at sides, 65 ft.; breadth molded, 36 ft.; breadth at top deck, 18 ft.; draught, light, 32 ft.; draught, extreme, 61 ft. All machinery will be electrically operated. The caisson will cost $400,000.

The Union Iron Works, San Francisco, Cal., is building an oil tank steamer for the Associated Oil Co. on the Isherwood System of longitudinal framing. The tanker will be 410 ft. long, 52 ft. beam and 27 ft. deep and will be equipped with triple-expansion engines and Scotch boilers, fitted with Dahl oil-burning system.

The wreck of the steamer W. C. Richardson, which sank outside of Buffalo harbor on Dec. 9, 1911, was blown up on Oct. 9. During the past two years repeated attempts have been made to recover the hull without success, and as it was in the direct pathway of vessels, it was deemed wise to destroy it altogether.

The Pittsburgh Steamship Co., following its settled policy, is disposing of its smaller class of tonnage. During the month it sold the steamer W. H. Gilbert to the Lakewood Steamship Co., managed by Hutchinson & Co., Cleveland, and the steamers Griffin, Wawatan and La Salle to Thomas Morrison, of Cleveland.

The Lehigh Coal & Navigation Co., which operates canal boats in eastern Pennsylvania in connection with its coal properties, has entered the market for 21 steel canal boats, one to be delivered immediately and the rest to be completed by April 1 next. The boats will be about 90 ft. in length and will call for from 50 to 75 tons of steel.

Steamer Kandahar

The Kandahar is a fine specimen of a modern cargo ship, and has just successfully run her trials at sea. She is the fifteenth vessel built by Swan, Hunter & Wigham Richardson, Ltd., for the lines controlled by Sir John Ellerman, Bt. The triple expansion engines and also boilers of the vessel were supplied by the Wallsend Slipway & Engineering Co., and they worked without a hitch during the trial to the satisfaction of all concerned. A speed of nearly 14 knots an hour was easily maintained on the measured mile. An interesting feature in the ship is the cruiser-shaped stern, which is a most uncommon feature in a cargo ship and gives increased carrying capacity. Swan, Hunter & Wigham Richardson, Ltd., were pioneers in the introduction of this shape of stern for merchant vessels. A few years ago they built two mail steamers for the Grand Trunk Pacific Railway Co., of Canada, with cruiser-shaped sterns. This form of hull proved very successful both as regards speed and internal arrangements. Other builders soon copied the design and some of the latest trans-Atlantic liners have sterns of similar shape due to the recommendation of Swan, Hunter & Wigham Richardson, Ltd. The leading dimensions of the Kandahar are 449 ft. over all and 55½ ft. beam, with a deadweight carrying capacity of 10,400 tons. The plans of the Kandahar and her construction were supervised by Alex Dalrymple, superintendent engineer of the Ellerman Lines, together with his assistant, R. Sharp.

In the bridge house amidships are cabins for the captain, officers and engineers, and there are also a number of commodious state rooms for a few passengers. The quarters of the seamen and firemen are in the poop. To facilitate loading and discharging cargo the ship is fitted with a large number of derricks, including one to lift 40 tons.

Colonel W. C. Gorgas, in charge of sanitation in the Canal Zone, has been given four months' leave of absence. He will, in company with Major Robert E. Noble and Dr. S. T. Darling, leave for Johannesburg, South Africa, to investigate the sanitation of the district of the consolidated mines of the Rand, at the request of the companies in the consolidation, which employ about 200,000 men.

President Wilson, acting in conjunction with the authorities of the canal zone, has promulgated maritime regulations for the harbors of the cities of Panama and Colon. Masters of vessels clearing from any foreign port or from any port in the possessions or other dependencies of the United States for a port in the canal zone must obtain an original bill of health in duplicate from the officer or officers authorized by the quarantine laws and regulations of the United States to sign such certificates.

SHIP BUILDING IN THE UNITED STATES

The bureau of navigation reports 376 sailing, steam, and unrigged vessels of 90,222 gross tons built in the United States and officially numbered during the three months ended Sept. 30, 1913, as follows:

	Wood						Steel					
	Sail.		Steam.		Unrigged.		Steam.		Unrigged.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and Gulf....	13	5,246	113	3,682	62	15,760	16	35,612	1	825	205	61,125
Porto Rico	1	37	..	.....	..	.....	.	.....	.	...	1	37
Pacific	1	7	55	4,984	32	2,547	3	2,837	1	368	92	20,743
Hawaii	.	.....	1	18	..	.....	.	.....	.	...	1	18
Great lakes	.	.....	28	662	9	1,368	6	14,639	3	1,160	46	17,829
Western rivers.....	.	.....	27	442	1	5	3	23	.	...	31	470
Total	15	5,200	224	9,788	104	19,680	28	53,111	5	2,353	376	90,222

During the corresponding three months ended Sept. 30, 1912, 485 sailing, steam, and unrigged vessels of 80,281 gross tons were built in the United States and officially numbered, as follows:

	Wood						Steel					
	Sail.		Steam.		Unrigged.		Steam.		Unrigged.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and Gulf....	22	6,783	136	4,970	42	9,212	13	27,113	.	...	213	48,078
Porto Rico	2	55	2	79	..	.....	.	.....	.	...	4	134
Pacific	5	712	63	5,774	23	2,827	3	4,254	.	...	94	13,567
Hawaii	.	.....	..	.....	..	.....	.	.....	.	...	..	.....
Great Lakes	1	5	86	1,560	11	705	13	12,844	5	2,208	116	17,322
Western rivers	.	.....	50	892	5	187	3	101	.	...	58	1,180
Total	30	7,555	337	13,275	81	12,931	32	44,312	5	2,208	485	80,281

SUMMARY OF NAVAL CONSTRUCTION.

Name of vessel.	Contractor.	Per cent of completion. Oct. 1, 1913. Total.	Oct. 1, 1913. Per-cent on ship.	Sept. 1, 1913. Total.	Sept. 1, 1913. Per cent on ship.
BATTLESHIPS.					
New York.....	New York Navy Yard.....	89.9	89.0	88.2	87.3
Texas	Newport News Ship Building Co.....	95.2	94.4	93.6	92.6
Nevada	Fore River Ship Building Co.....	45.5	26.7	42.8	22.7
Oklahoma	New York Ship Building Co.....	45.3	36.1	41.9	32.4
Pennsylvania	Newport News Ship Building Co.....	9.1	2.8	4.5	1.0
	New York Navy Yard.....	....	....	....	....
DESTROYERS.					
Cummings	Bath Iron Works.....	*		98.4	98.4
Downes	New York Ship Building Co.....	74.7	73.7	69.2	68.1
Aylwin	Wm. Cramp & Sons.....	97.0	97.0	97.0	97.0
Parker	Wm. Cramp & Sons.....	95.0	94.8	94.7	94.5
Benham	Wm. Cramp & Sons.....	92.9	92.7	92.8	92.6
Balch	Wm. Cramp & Sons.....	92.2	92.0	92.0	91.8
O'Brien	Wm. Cramp & Sons.....	11.7	4.3	9.2	2.3
Nicholson	Wm. Cramp & Sons.....	11.8	4.3	9.3	2.3
Winslow	Wm. Cramp & Sons.....	11.8	4.3	9.1	2.3
McDougal	Bath Iron Works.....	23.2	15.5	14.7	6.5
Cushing	Fore River Ship Building Co.....	19.5	12.9	14.7	7.2
Ericsson	New York Ship Building Co.....	11.8	3.9	11.0	3.5
DESTROYER TENDERS.					
Melville	New York Ship Building Co.....	....	....	....	....
SUBMARINES.					
G-4	American Laurenti Co. (Phila.).....	96.3	95.4	96.3	95.4
G-2	Lake Tow Boat Co. (Bridgeport).....	88.3	88.3	88.1	88.1
H-1	Electric Boat Co. (San Francisco)	97.7	97.7	96.2	96.2
H-2	Electric Boat Co. (San Francisco)	97.7	97.7	96.2	96.2
H-3	Electric Boat Co. (Seattle)	92.9	92.8	92.1	91.6
G-3	Lake Tow Boat Co. (Bridgeport).....	72.0	71.6	70.4	70.1
K-1	Electric Boat Co. (Quincy	92.6	92.6	90.6	90.1
K-2	Electric Boat Co. (Quincy)	90.1	89.6	88.0	86.7
K-3	Electric Boat Co. (San Francisco)	85.9	84.9	84.6	83.4
K-4	Electric Boat Co. (Seattle)	85.3	83.2	81.7	78.4
K-5	Electric Boat Co. (Quincy)	76.4	73.5	74.8	71.8
K-6	Electric Boat Co. (Quincy)	75.5	72.6	73.7	70.7
K-7	Electric Boat Co. (San Francisco) ...	77.0	75.0	75.2	73.0
K-8	Electric Boat Co. (San Francisco)	75.1	73.1	73.7	71.5
L-1	Electric Boat Co. (Quincy)	9.1	6.2	7.1	4.4
L-2	Electric Boat Co. (Quincy)	9.1	6.2	7.1	4.4
L-3	Electric Boat Co. (Quincy)	9.1	6.2	7.1	4.4
L-4	Electric Boat Co. (Quincy)	9.1	6.2	7.1	2.7
L-5	Lake Tow Boat Co. (Bridgeport)	7.3	...	6.8	...
L-6	Lake Tow Boat Co. (Long Beach, Cal.)	...	...	...	...
L-7	Lake Tow Boat Co. (Long Beach, Cal.)	...	...	...	...
M-1	Electric Boat Co. (Quincy).....	7.7	4.8	6.8	3.9
SUBMARINE TENDERS.					
Fulton	New London S. & E. B. Co. (Quincy)	18.6	10.7	15.6	7.0
Bushnell	Seattle Construction & D. D. Co.....	1.0	....	....	....
FUEL SHIPS.					
Nereus	Newport News Ship Building Co.....	†	....	99.0	99.0
Kanawha	Mare Island Navy Yard.....	3.1	1.9	1.6	1.6
Maumee	Mare Island Navy Yard.....	0.1	0.0	0.1	0.0
GUN BOATS.					
Sacramento	Wm. Cramp & Sons.....	47.9	44.8	42.1	38.4
Monocacy	Mare Island Navy Yard.....	83.9	82.7	64.4	62.0
Palos	Mare Island Navy Yard.....	83.9	82.7	64.4	62.0

*Completed and delivered at Boston yard Sept. 19, 1913.
†Completed and delivered at Norfolk yard Sept. 10, 1913.